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TABLE OF CONTENTS

Neurosis in Flying Personnel C. P. SYMONDS, D.M. 703

Diphtheria Alum-precipitated Toxoid GUY BOUSFIELD, M.D. 706

Duration of Artificial Active Immunity against Diphtheria H. LYNDHURST DUKE, M.D., and W. B. STOTT, L.R.C.P. 710

Gunshot Wound of Innominate Artery G. F. LANGLEY, F.R.C.S. 711

Tuberculosis in London W. ALLEN DALEY, M.D., and B. BENJAMIN, B.SC. 712

Long-period Recurrences in Cancer J. H. DOUGLAS WEBSTER, M.D. 720

Survival Rates in Pulmonary Tuberculosis BRIAN C. THOMPSON, M.D. 721

MEDICAL MEMORANDA

Trichlorethylene and Trigeminal Anaesthesia. J. MCAULEY, L.R.C.P. ...713

Intraperitoneal Rupture of a Wilms Tumour. C. H. TANNER, F.R.C.S. ...714

GENERAL ARTICLES AND NEWS

Simple Continuous Intravenous Anaesthesia. R. SHAW, M.R.C.S. 715

ALTERATIONS IN THE *B.P.* 721

THE SERVICES 731

MEDICAL NOTES IN PARLIAMENT 733

MEDICAL NEWS 733

REVIEWS

Walter Reed and Yellow Fever 714

Fractures and Joint Injuries 714

Rehabilitation of the Maimed 715

Notes on Books 715

LETTERS AND ANSWERS

Treatment of Undulant Fever—Pyelitis in a Diabetic—Doctor Practising as Dentist—How Sulphonamides Act — Infertility and Impotence—The Allergic Nose—Scarlet Fever—Alcohol and Vitamin Deficiency—Sedimentation Rate—Burr Holes in Skull—Burning Feet—Income Tax—The D Vitamins—Chicken-pox after Contact with Shingles 734–6

Epidemiology Section 732

LEADING ARTICLES

Immunization against Tuberculosis...716

Outbreak of Influenza 717

ANNOTATIONS

Control of Narcotics 718

Psychopathic Personality and the Electro-encephalogram 718

Malaria Control in Freetown Harbour 718

The Police Decoy and the Doctor ...719

Medical Specialists for Malta 719

Medical Research Council 719

OBITUARY

E. C. Lindsay, C.B.E., F.R.C.S. 730

F. Craven Moore, M.D., F.R.C.P. 730

J. M. Johnston, M.B., D.P.H. 730

E. G. C. Daniel, M.A., M.B. 730

G. H. Leigh, M.D., D.P.H. 731

G. F. Rogers, M.D. 731

H. G. Cronk, M.A., M.B. 731

J. F. W. Silk, M.D. 731

SUPPLEMENT

General Medical Council *94*

LEEDS JOINT COUNCIL ON INDUSTRIAL MEDICINE *95*

CORRESPONDENCE *93*

H.M. FORCES APPOINTMENTS *95*

BRANCH AND DIVISION MEETINGS *96*

POSTGRADUATE NEWS *96*

CORRESPONDENCE

R.M.B.F. Christmas Gifts. Sir THOMAS BARLOW, M.D. 724

Social Medicine and the Physician. A. ST. G. HUGGETT, M.B. 724

Early Recognition of Cancer. F. ELLIS, M.B. 724

Attack on Pulmonary Tuberculosis. PETER W. EDWARDS, M.B. 724

Financial Allowances in Tuberculosis. GRIFFITH EVANS, F.R.C.S. 724

Transplanting Ureters into Large Bowel. G. GREY TURNER, F.R.C.S. 725

Wartime Diet for Peptic Ulcer. T. L. HARDY, M.D.; Sir ARTHUR HURST, D.M. 725

Agents Provocateurs. REGINALD PAYNE, F.R.C.S. 725

Parodontal Disease. E. W. FISH, M.D...726

Dentistry and Medicine. S. H. WADDY, F.R.F.P.S. 726

Therapeutic Fallacies: Calcium in Haemorrhage. W. R. GROVE, M.D. ..727

Artificial Insemination. MARY BARTON, M.B. 727

Wartime Day Nurseries. B. R. ABELSON 728

Anaesthetist's Third Hand. M. W. P. HUDSON, M.B. 728

"Fatigue Fractures." J. B. HARTLEY, M.B.728

Vincent's Infection during Arsenical Treatment. DAVID ERSKINE, M.D. ..729

Fusospirillary Balanitis. S. F. BERNDT, M.D.729

Psychiatry at the Cross-roads. T. M. CUTHBERT, M.R.C.S. 729

Paper Control. S. C. WAKE, M.B. 730

REPORTS OF SOCIETIES

TUBERCULOSIS ASSOCIATION:

B.C.G. Immunity in Tuberculosis...722

R.S.M.: Ophthalmia Neonatorum ...723

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BRITISH MEDICAL JOURNAL

LONDON SATURDAY DECEMBER 4 1943

THE HUMAN RESPONSE TO FLYING STRESS*

BY

C. P. SYMONDS, D.M., F.R.C.P.

Air Commodore, R.A.F.V.R.

LECTURE I: NEUROSIS IN FLYING PERSONNEL

Historical

When Dr. James Birley (1920a) gave the Goulstonian Lectures twenty-three years ago on Medical Science and Aviation he described in words which have lost none of their freshness and vigour the picture of what he called flying stress, and because this term has been widely employed I shall begin by explaining the sense in which Birley used it and the change of meaning that has since taken place. Birley and his colleagues were confronted with the twofold problem of studying, first, the unknown factors of stress to which the airman was exposed, and, secondly, the effects of this stress upon the human organism. Unfortunately, as so often happens in the study of functional nervous disorder, the distinction between causes and symptoms was in the end ignored, and "flying stress," which was appropriately coined for the load which the airman had to carry, was later used to describe the state of ill-health which resulted when this load was too heavy. Flying stress, in fact, became a clinical diagnosis.

The implication that the occupation of flying had resulted in a new disease found ready acceptance not only because the occupation was so new and so dramatic but because there seemed evidence that lack of oxygen, which at that time was inevitable in high flying and unknown in any other occupation, could cause functional nervous disorder of a widespread and long-lasting kind. It was certain, at any rate, that a person actually suffering from anoxia showed psychological disorder as well as other symptoms. It was assumed that repeated exposure to anoxia might lead to persistent effects of the same kind. Thus Flack (1920), who was one of the pioneers in aviation medicine, attributed nervousness, insomnia, lack of confidence, and disinclination to fly to this cause. Birley (1920b) soon became suspicious of this opinion, for he observed these symptoms in men who had not flown at high altitudes. He suggested that the cause in these cases was occupational fatigue. The position of flying stress as an occupational disease was thus upheld. Later, however, he noted that the same symptoms might be seen in men who had neither flown at high altitudes nor flown long enough to suffer from cumulative fatigue. He observed that in this group there was often a family or personal history of neuropathy, and suggested that here there was temperamental unfitness "which," he said, "lies largely in an undue susceptibility to mental shock, to which these individuals react primarily by various mental and psychical phenomena and secondarily by various alterations in their physical state."

How far this last observation has been confirmed and extended during the present war I shall hope to show. I may anticipate now by saying that there is no more warrant for the use of "flying stress" as a term of clinical diagnosis than there was for "shell-shock," which, it was agreed by the War Office Committee (1922) appointed to inquire into the subject, was wholly misleading, "and should be eliminated from official nomenclature, the disorders hitherto included under this heading being designated by the recognized medical terms for these conditions." The objection to the use of "flying stress" as a diagnosis of course applies equally to other terms such as "aeroneurosis" and "aviator's neurasthenia." All are founded upon error, and might well—as shell-shock did—have become a danger to morale. "Flying stress" should be used only to denote the load which air-crews have to carry. For the ill effects which may result in some persons from overloading, terms of ordinary clinical usage will suffice.

Scope and Methods of Present Investigation

In our study of functional nervous disorder in flying personnel during the present war we began with certain advantages. Before long the apparatus for maintaining oxygen supply at heights had been so perfected that it was usually possible to exclude anoxia as a causal factor unless there was evidence that the apparatus had not been properly used or had gone wrong. Our view of the neuroses also was broader and deeper than had been possible 25 years ago. Our approach to the problem rested upon the belief that the symptom pattern or reaction type of a neurosis cannot be related to any single cause—that an anxiety state, for example, may have as its main cause emotional conflict, infection, or exhaustion; and that, standing between environmental stress and symptom pattern, individual constitution is all-important.

At the direction of Air Marshal Sir Harold Whittingham, for some time all cases of neurosis in flying personnel have been analysed on the basis of data collected by the neuropsychiatric specialists of the Royal Air Force. The inquiry was restricted to cases seen by the specialists, with the knowledge that this would exclude some of the milder cases; but the restriction was necessary to obtain data of consistent value, and it is certain that almost all flying personnel in this country and in the Middle East in whom there was any question of unfitness for full duty on account of functional nervous disorder were seen by the specialists, and are included in this investigation. The specialist fills in a card for every case seen, sending it to a central registry, where the data are extracted. The information recorded in addition to the particulars of the man's service, flying hours, and tactical duties includes the reaction type of the illness and the main causal factors. Three further questions are set. One is concerned with flying, and is in two parts. First, Has the illness arisen from *flying duties*, and, if so, what were the incidents responsible? Second, What was the weight of *flying stress* to which the patient had been subjected? Our instructions on this point are that the assessment of flying stress as *nil*, slight, moderate, severe, or exceptional should be made in relation to the average load carried by healthy persons in this occupation. The problem was not whether the man in question had had to carry more than he could manage, but whether the load had been greater than

* Based upon the Dunham Lectures at Harvard University, March, 1943, and the Croonian Lectures before the Royal College of Physicians of London, May, 1943.

that which the ordinary man could take. The next question asks for an estimate of *non-flying stress*—for example, domestic worries—as *nil*, moderate, or severe, with relevant data. The last requires an estimate of *predisposition* to functional nervous disorder as *nil*, moderate, or severe, again with supporting data if the assessment is positive. The agreed criterion for severe predisposition is that the specialist considers that if he had seen the man as a candidate for air-crew he would have advised rejection. A few case summaries will illustrate the nature of the material collected.

Cases Illustrative of Predisposition and Stress

Case 1: Sgt. X., pilot, aged 23; flying hours, 190; operational hours, *nil*.—His father had suffered from an obsessional neurosis, and he himself had been away from school for six months at the age of 9 owing to what he described as "a mania for tapping things and screwing his eyes up." He always tended to worry unduly over small things. He had no unpleasant experience in training or any personal worries, but when he began flying Hudsons the noise of the engine, he said, "got on his nerves." He could think of nothing else, and developed headache and insomnia. This is a straightforward example of an obsessional neurosis in a man who would never have been accepted for air-crew had his history been disclosed. Although flying duties had contributed to the breakdown, flying stress was *nil*. Non-flying stress was also *nil*. Predisposition was severe.

Case 2: Fl. Lt. Y., D.F.C.; pilot, aged 23; flying hours, 600; operational hours, 120 in day bombers (25 sorties).—This officer presented with headache, insomnia, anxiety, depression, and loss of confidence for flying. There was no evidence of neurotic predisposition. He had gone through an operational tour with distinction at a time when casualties were heavy. He then married and had been flying on instructional duties for a year. His symptoms developed when he himself was unfit (a fortnight convalescent from appendicectomy) and his child died suddenly. The neurosis (anxiety and depression) was not considered attributable to flying duties. He was a man who had been submitted to a slight degree of flying stress. Predisposition was *nil*, non-flying stress severe.

Case 3: P/O Z., G.M.; pilot, aged 27; flying hours, 240; operational hours on day bombers, 100.—This officer had since childhood been unduly sensitive to slights, easily depressed, and lacking in confidence. His squadron suffered heavy casualties, and eventually he was wounded in the leg on a sortie over the North Sea. He flew his damaged aircraft home, but it blew up on landing. He won the George Medal for pulling his air-gunner out of the blazing wreckage. After two months in hospital he was physically fit to fly, but was tense, anxious, depressed, and self-reproachful. The illness here was clearly attributable to flying duties. Flying stress was rated as severe. Predisposition was moderate, non-flying stress *nil*.

Case 2 is representative of a group in which the neurosis, though resulting in incapacity for flying duties, was due to causes unrelated to flying. Excluding this group and confining our attention to neuroses which have arisen from flying duties, we have asked ourselves among other questions what are the important factors in causation, how the neurosis develops, and what are the commonest reaction types. With this purpose the data recorded on a consecutive series of 2,000 cases have been analysed, and as a separate investigation representative station and squadron commanders as well as medical officers in the Training and home-based Operational Commands have been interviewed by Squad. Ldr. Denis Williams and myself and asked these two questions: "What are the things which get men down?" and "How do you know when a man has had enough?" It was hoped that this inquiry, systematically developed, would give us a better idea both of causes and of early symptoms than can be obtained from the evidence of men who have developed a neurosis. Actually it did more than this, for many of the 200 flying personnel interviewed volunteered accounts of their own reactions to stress. Such introspective material furnished by distinguished officers of great experience has been a valuable addition to our knowledge. The records of cases of neurosis seen personally have provided an additional source of information. Some of the conclusions reached by these means will be briefly presented.

Distribution and Causes of Neurosis

There has been no difficulty in the classification of cases under the ordinary clinical headings. Anxiety states occurred in 79% of the cases, depressive states in 9%, and hysteria in 13%; mixed forms were not infrequent—hysteria, for example, being often grafted upon an anxiety state. Our tables, which cannot for Service reasons be published now, show that the incidence of neurosis in different tactical duties varies directly with the amount of hazard encountered, as measured by the casualty rates. It is thus lowest in Training Command, highest in night bombers. In duties which involve long trips with relatively little hazard the incidence of neurosis is low, suggesting that emotional tension is a more important factor than physical or skill fatigue. That skill fatigue is probably an operative factor is shown by a rather higher incidence in pilots than in all other members of air-crew taken together; but the highest for a specific duty is among rear gunners of heavy bombers, where skill fatigue is negligible but emotional tension high. Although causal factors of a physical kind have been systematically inquired for—exhaustion, air-sickness, altitude effects, cold, physical injury, and illness—they have been recorded in less than a third of the cases, and then generally as subsidiary factors. Altitude and cold were in fact not recorded in any case. By contrast, psychological factors have been present in 99% of the cases.

We have found plenty of evidence to support Birley's suggestion that temperamental unfitness for the job was an important causal factor. More than two-thirds of our cases show what he referred to as a family or personal history of neuropathy, which in this investigation we have called predisposition to neurosis. These men are vulnerable to stress, and the severely predisposed often break down over flying duties without being exposed to any flying stress as judged by average experience. At the other extreme stress may be severe enough to cause a breakdown in men with no predisposition. In the intermediate group the inverse relationship between flying stress and predisposition is striking, so that it can be stated that the more flying stress a man has experienced before breaking down the less evidence of predisposition will be found in his history.

Percentages of Patients with Varying Predisposition exposed to Differing Degrees of Stress

Predisposition	No.	Flying Stress					Non-flying Stress		
		Nil	Slight	Mod	Sev.	Exc.	Nil	Mild	Sev.
Nil	604	18	27	33	20	2	62	34	4
Moderate ..	1,173	30	30	28	11	1	64	33	3
Severe ..	423	47	32	15	6	0	64	33	3

This table shows that non-flying stress is almost identical in the three groups, and that it is the flying stress which is responsible for the reciprocal relationship between stress and predisposition, since it falls steadily as predisposition increases in the three groups.

As would be expected, the amount of flying stress rises steadily with the number of hours flown, and especially with the number of operational hours. Corresponding with this, our figures show that the more flying experience, and especially the more operational experience, a man has had before breaking down the less likely we are to find predisposition. In fact, the severely predisposed individuals tend to break down relatively early in their flying career, leaving those with less or with no predisposition either to succeed or to break down later as the result of greater experience and greater stress.

Among the cases in which the neurosis was mainly attributable to flying duties, factors included under non-flying stress had contributed in 36%. These factors might of course be physical or psychological, but were in fact almost always the latter and usually arose from domestic anxiety. In this connexion it has been of interest to observe that the incidence of non-flying stress is higher in married than in single men, and that among operational air-crew it has been highest in the Middle East Command, doubtless owing to the anxieties inseparable from prolonged service abroad.

In our assessments of predisposition we have been guided by the principles of general clinical experience and by the special experience of flying personnel who have broken down. The importance of family and personal history in relation to the risk of neurosis under conditions of active service has received attention in papers published during the present war by Curran and Mallinson (1940), Hadfield (1942), Love (1942), and Cooper and Sinclair (1942). Gillespie (1942) has emphasized the frequency in childhood of a history of specific tendencies indicating timidity and lack of aggressiveness in flying personnel who have developed neurosis under the strain of flying duties, and our joint experience has confirmed the value of his

observations. As an example the avoidance of diving by a practised swimmer is evidence of a kind of timidity often found in the past history of those with neurosis. The validation, by follow-up, of the prognostic value of such traits is likely to be of practical value for selection. We do not know yet what is their distribution among those who succeed. We have nevertheless some ground for belief in the practical value of our criteria, for the investigation of unselected air-crew by the same methods and by several observers working independently has shown the incidence of predisposition to be four and a half times lower than among those who have broken down.

The quantitative assessment of the abstraction flying stress proved less difficult than was anticipated. Its success is shown by the striking uniformity of the percentage of cases recorded as exposed to the different degrees of stress in the various operational commands, and the consistency of assessments made independently on the same case by different observers. The specialists had, of course, already had considerable experience of Service flying conditions when the investigation began.

Fear as an Element of Flying Stress

Evidence has already been presented for the conclusion that the most important element of flying stress as a cause of neurosis is exposure to danger. This is confirmed by analysis of the psychological causes which were held responsible in 99% of the cases of the series under review; for the story in most of them is that of a persistent state of fear resulting from either excessive stimulation of this emotion in men without predisposition to neurosis or from a lesser stimulus in the predisposed. This, again, simply confirms previous observation in other combatants (Mapother, 1935; Dillon, 1940; Love, 1942; Cooper and Sinclair, 1942). It is evident, therefore, that in the prevention of neurosis in flying personnel serious consideration should be given to the subject of fear.

Fear is a state of feeling which is only strictly ascertainable by introspection, though it is often associated with behaviour indicating a tendency towards flight and with bodily disturbances which have been extensively studied by physiologists. The objective study of fear can never take us to the heart of the problem, but studies of the reactions of young children to situations of a kind which excite fear in adults are of value in tracing the origins of the fear response. The observations of Valentine (1942) are of especial interest. It appears that there are innate trigger mechanisms which provide for a constant behaviour response to certain stimulus patterns. These triggers, however, are not all present at birth. Most of them mature later. For example, a fear response to the dark was not observed by Valentine before the age of 2, but was of common occurrence at later ages. There is considerable individual variation in the number and selective response of these innate responses. One child, for example, may show fear responses to fewer fear situations than the average; another may show more than the normal sensitiveness to a particular type of situation, such as a moving animal. This last observation is of especial interest in connexion with the specific irrational fears or phobias of adults, which may be associated with relative fearlessness in other directions and appear in some cases to be inherited. Granted these trigger mechanisms, it may be argued that fear responses to more complex situations are built up in the manner of conditioned reflexes. This hypothesis leaves out of account the question of the existence, as a part of the original trigger response, of the affective quality which is fear. Valentine's critical comment deserves quotation. "We can," he says, "only distinguish these responses from mere reflexes by saying that they are at least the first of a series of responses which, remaining and developing within a corresponding series of external conditions, are eventually known by adults to be accompanied by the emotion of fear."

The experimental observation of fear in animals is obviously fraught with greater difficulty, for there is never the opportunity of establishing the association of behaviour with feeling. Nevertheless, as Bard (1939) remarks, we are justified in asserting that a dog or a cat is displaying rage or fear without committing ourselves to the determination of its subjective state. Accepting this limitation, we may take note of the spontaneous display of fear following experimental lesion of the hypothalamus. Here is evidence suggesting that the affective state of fear may exist independently of any perception or idea of danger. There is clinical evidence to support this. In some cases of affective disorder the patient's complaint is that he feels afraid though there is nothing either in fact or in imagination which should cause this feeling. There is suggestion here of a central mechanism for the generation of affect, which under certain abnormal conditions may result in a fear state arising or persisting without activation by the stimuli which normally excite it.

The observation of bodily changes such as pulse rate or sweating is of little value in ascertaining the presence of fear, for they are common to other emotions. Physiologists in their analysis of these bodily changes have emphasized their value as preparation for adequate response to danger. Less attention has been paid to the psychological value of fear. It is nevertheless widely recognized that fear, within limits, is not only a natural but a healthy emotion, stimulating attention, sharpening judgment, and evoking maximal effort. I have frequently heard the opinion from distinguished pilots that fear in due measure may be a vital asset in reacting to an emergency, whether in flying or in combat, and that the absence of fear in a situation of this kind may be fatal to success.

Fear of course is often felt in the absence of actual danger. The most familiar example is anticipatory fear, or apprehension, either of real or of imaginary dangers. This, again within certain limits, may be valuable. An experienced squadron commander told me that he liked a man to have enough imagination to fear the worst and hope for the best. Thus he would set forth on his operational sortie prepared for every hazard, and would be more likely both to succeed and to survive than the more phlegmatic types. Incidentally, he added that this kind of man, though he was most likely to give good operational service, was most likely to suffer from the effects of stress. Another common and interesting example of fear in the absence of actual danger is that which, after danger is past, may be experienced by an imaginative person when he reflects upon a narrow escape. Here it seems that the magnitude of the impending disaster has been such, or its passage so swift, that full perception is delayed. The more time and opportunity there is for reflection the greater the tendency to the development of this delayed fear reaction. Thus the man who has been hurt in a flying accident and lies idle may be at a disadvantage by comparison with his comrade who after the same accident remains on duty, his mind occupied with other matters. This does not mean that retrospective fear is inappropriate or unhealthy. On the contrary, it may be of value in pointing experience. The fighter pilot if he has the right spirit gains in value from a narrow escape in combat. Fear within certain limits is a stimulus; only when it exceeds these limits is it a weakness.

The persistence of fear after danger is past is not always to be explained by reflection and rumination, for it may be recognized by the subject as irrational. Mosso (1896) observed this point. After a fear response which has been due to misinterpretation of a situation the individual discovers his mistake and is glad; yet the "perturbation and oppression do not at once subside, but continue to annoy for some time. They are like the continued vibration of a cord that has been shaken—like the echo of a sound reverberating in the nervous fibres and slowly dying away." This tendency for fear to perseverate may be observed in many persons if the stimulus has been violent; but in relation to stimuli of average intensity it is remarkable in certain individuals, suggesting an innate propensity to react in this manner.

I have referred to the value of fear as a stimulus within certain limits. It is necessary now to define these limits. They are set by standards determined not only by the needs of the individual but also by those of his social unit. For both these needs it is essential that emotions other than fear should have free play—anger and loyalty, for example. It is when fear dominates the mind to the exclusion of other emotions that it becomes harmful. "The phenomena of fear, which may be useful in lesser degrees, become morbid and fatal to the organism as soon as they exceed a certain limit: for this reason fear must be looked upon as a disease" (Mosso). For the combatant group, whether air-crew, ship's company, or

platoon, fear in excess is of course a deadly disease—so much so, that during the last war it must be camouflaged and called "wind up." The ancients also felt it necessary to disarm fear, and used their conventional method of appeasement. Alexander of Macedon offered up sacrifices to Fear before he went into battle. In Naples there are two Roman medals, one of which bears the impression of a terrified woman, the other of a man with hair on end and staring eyes. They were struck in fulfilment of the vows made by the Consuls before a certain battle to propitiate fear, which threatened to invade the ranks of the soldiers, who after this measure had been taken were led to victory. It is interesting to observe, in the books and plays already produced by the present war, frank reference to fear, and to speculate upon the reasons which have allowed this. Whatever these may be, for us who study flying stress it is an advantage to discard the old convention and to admit fear in excess as the kernel of our problem. As Mosso remarks in his spirited introduction to this subject: "The time has come when we must throw off our professorial robes, tie on our aprons, roll up our sleeves, and begin the vivisection of the human heart according to scientific methods."

Although fear is frankly admitted by flying personnel individually in their published records of combatant experience, and in serious discussion of flying stress, official documents in the flying Services speak not of fear but of lack of confidence. Doubtless there is here an underlying preference for meiosis, but there is more in the term than this. It implies the lack of a virtue rather than the presence of a vice. Confidence is a positive quality of inestimable value to the airman. Without it he can never achieve outstanding success, and despite every effort he is likely to succumb sooner or later to the effects of flying stress. Lack of confidence is a major cause of flying accidents, operational failures, and psychological breakdown in air-crews. What, then, is meant by confidence? It is, I believe, compounded of if not identical with fearlessness, and will be the subject of my next lecture.

(Lecture II, with the full list of references, will appear in our next issue)

DIPHTHERIA ALUM-PRECIPITATED TOXOID

OBSERVATIONS ON IMMUNITY RESPONSE IN THE HUMAN SUBJECT TO VARYING Lf DOSAGE COMBINATIONS

BY

GUY BOUSFIELD, M.D., B.S.Lond.

The investigations were designed to determine the optimum usage of a minimal (or suboptimal) number of Lf units of A.P.T., given as two injections at a monthly interval. The results appear to indicate that when the antigen is thus economically employed there exists a certain essential balance between primary and secondary stimuli. It is believed that information of this description has not yet been produced regarding the behaviour of A.P.T. when injected into the human subject. Principles established in the case of diphtheria A.P.T. may well have a bearing on the optimum usage of antigens associated with other diseases. The following conditions of work and observations are detailed:

1. All precautions in technique were taken as suggested by me previously (Bousfield, 1942).

2. Antigen employed: Squibb A.P.T., Batch 74075, of 27 Lf per c.cm. when prepared in the U.S.A. The Lf value at the time of use was reported by Dr. Percival Hartley to be 21 units, though flocculation was delayed. The latter would not appear to have detracted seriously from the antigenic value, as may be judged from results. During the period of use the A.P.T. was stored under ideal conditions. The antigen was suitable for this type of investigation, being neither too potent nor too weak for adequate dosage variations in convenient fluid measurements. It is useless to employ a high Lf/c.cm. sample for research into the principles of dosage.

3. Population: a suburban area (borough of Heston and Isleworth). The natural Schick-negative rate of children attending the clinics was low—only 6.2% over a period of two years during which the work was performed. Diphtheria incidence had also been very low during the last 12 years, only once having reached the level of slightly over 1 per 1,000 of population in that time.

4. Age groups in the various investigations were kept as constant as possible.

5. The work was performed throughout by one operator.

6. The Schick test was adopted as the criterion of a minimum satisfactory antitoxic response, as blood antitoxin titrations on large numbers of small children are not feasible. The Schick toxin used in all testing was obtained from one source. In the process of retesting the dosage combination employed was not known to the observer until the arm had been inspected. Prejudice in favour of any anticipated result was thereby excluded.

7. All cases described were originally demonstrated to be Schick-positive.

8. Injections of A.P.T. were given by the deep intramuscular route into the deltoid.

9. All post-immunization Schick tests were made from three to five months (nearly always three) after the final injection of A.P.T. This long interval was adopted because many other methods and antigens had been investigated at the same post-Schick interval in the past. Thus results were more informative to me than if the post-immunization tests had been performed after a considerably shorter interval designed to identify subjects at the time of peak antitoxin production. As all groups of children studied were post-tested at about the same average interval, the comparative value of the various results should not suffer by the adoption of the longer interval between injection and testing. Again, from the practical standpoint it is more important to know the conversion rate at a fairly long range rather than at the time of peak antitoxin.

10. The numerical limits of the investigation were determined by the supply of antigen of the same batch number that was available. Other A.P.T. of the same Lf titre might have been employed, but Lf value is not necessarily directly related to immunizing power; thus such procedure could have formed no part of any attempt at a precise series of observations.

11. All doses are described in terms of Lf units as well as fluid measurement. To speak of volumetric dosage alone is most misleading, as in the past much A.P.T. from certain sources proved to be well below the now desired standard of 50 Lf/c.cm.

TABLE I.—*Antigen: Squibb A.P.T., Batch 74075 (Strength 21 Lf per c.cm.). Showing Schick Conversion Rate in 1,199 Children. Intramuscular Injections at 28 Days' Interval in Various Dosage Combinations*

Group	Lf and Fluid Dosage	Total Lf	No. of Cases	Post-Schick		Conversion Rate (%)	Av. Age of Group (years)	Av. Age of Post-Schick (years)	
				Pos.	Neg.			Neg.	Pos.
1	2·1 + 6·3 Lf 0·1 + 0·3 c.cm.	8·4	169	59	110	65·1	4·6	4·0	5·8
2	6·3 + 2·1 Lf 0·3 + 0·1 c.cm.	8·4	124	19	105	84·7	4·4	4·0	6·5
3	4·2 + 6·3 Lf 0·2 + 0·3 c.cm.	10·5	131	26	105	80·2	4·2	3·8	5·7
4	6·3 + 6·3 Lf 0·3 + 0·3 c.cm.	12·6	137	9	128	93·4	4·3	4·3	5·1
A	2·1 + 8·4 Lf 0·1 + 0·4 c.cm.	10·5	109	18	91	83·5	4·0	3·5	6·3
B	8·4 + 2·1 Lf 0·4 + 0·1 c.cm.	10·5	116	10	106	91·4	4·0	3·7	7·1
5	2·1 + 10·5 Lf 0·1 + 0·5 c.cm.	12·6	95	23	72	75·8	4·7	4·2	6·6
6	10·5 + 2·1 Lf 0·5 + 0·1 c.cm.	12·6	95	20	75	78·9	4·8	4·5	6·0
7	4·2 + 8·4 Lf 0·2 + 0·4 c.cm.	12·6	108	12	96	88·9	4·1	3·8	7·1
8	8·4 + 4·2 Lf 0·4 + 0·2 c.cm.	12·6	115	7	108	93·9	4·4	4·2	7·4

The results of these investigations appear in Table I, and the order here given indicates the progress of the work as a result of accumulating experience. It should be noted that 0.1 and 0.3 c.cm. formed the dosage of this A.P.T. directed

by the instructions. All subsequent work represented an increase on this dosage.

The inferences from the table are: (i) That, using this antigen, a satisfactory conversion rate is not approached until a total of about 12.6 Lf units is employed. This is shown at 4. (ii) That comparison of 4, 5, 6, 7, and 8 shows that this dosage of 12.6 units appears to require usage on certain fairly well defined principles; otherwise there is undue failure to convert. This is set forth briefly in Table II.

TABLE II.—*Usage of 12.6 Lf in Varying Dosage (Conversion Rates). All Ages 1–12 inclusive*

Group	Fluid Dosage	Lf Dosage	Re-Schick Positive	Re-Schick Negative	Conversion Rate (%)
a	0·1 + 0·5 c.cm.	2·1 + 10·5	23	72	75·8
b	0·5 + 0·1 c.cm.	10·5 + 2·1	20	75	78·9
c	0·2 + 0·4 c.cm.	4·2 + 8·4	12	96	88·9
d	0·4 + 0·2 c.cm.	8·4 + 4·2	7	108	93·9
e	0·3 + 0·3 c.cm.	6·3 + 6·3	9	128	93·4
					$\chi^2 = 26·2$ $P < 0·01$

$P < 0·01$ signifies that the differences shown in the above table would not occur by chance as often as once in a hundred times.

This table was submitted to the χ^2 test and found to be significant for the total age groups of from 1 to 12 years. However, so many factors enter into this type of work that it is doubtful whether many of these can be introduced into any mathematical proof of statistical significance. The results are presented rather in the light of strong probabilities based on careful work. The findings in Table II are rendered more instructive as methods *a*, *b*, *c*, and *d* were investigated largely in parallel.

It should be stated here that any children concerned in Table I who were found to be Schick-positive after the injections received such further treatment as was considered necessary to render them Schick-negative. In practically every case an injection of 0.5 c.cm. of A.P.T. sufficed.

Table II appears to indicate that, when minimal quantities of A.P.T. are used:

1. Neither the primary nor the secondary stimulus should form too small a part of the whole dosage (vide groups *a* and *b*).
2. That the primary stimulus should consist of not less than half of the total Lf employed, and may favourably be as great as two-thirds of the whole dosage. This is shown at *d* and *e*.
3. That the allotment of two-thirds of the total Lf to the secondary stimulus seems to leave rather too small a balance for the primary. This is seen at *c*.
4. That, from the practical aspect, two equal stimuli appear to form the most convenient economical usage of such a minimal quantity of A.P.T. Series *e* illustrates this.

Full tables, analysed into age groups, have been prepared, but these are too lengthy to be included here. I will be pleased to supply a copy on request. From these, statistical significance can be estimated.

The investigation demonstrates why, in the past, failure has been experienced in using A.P.T. which had declined to half or more of its original potency. It should be noted that the weak point when using A.P.T. which has lost Lf value is chiefly to be found in the inadequacy of the primary stimulus. Most orthodox dosage allows a very generous secondary stimulus. The dangers of the small and weak initial injection are easily seen in Table I.

In the same table two series marked A and B have not been discussed, as difficulty was encountered in the post-Schick testing due to trouble with the test toxin. Optimistic findings resulted, but as both series were subject to the trouble to about the same extent they have been included as providing some evidence on the next aspect to be discussed.

Reversal of Larger and Smaller Doses of Same Total Quantity of Antigen

Reference again to Table I shows that wherever the larger portion of the total dosage has been given first, a better conversion rate results. Comparison of groups 1 and 2, A and B, 5 and 6, and 7 and 8 illustrates this. Only in the case of series 1 and 2 can the phenomenon be shown to be significant by the difference being greater than twice the standard error, but the fact remains that the administration of the larger portion first consistently produces better conversion rates throughout the series. This is at least of some significance. It will be noticed that this difference becomes less marked as the total dosage employed increases.

Comparison of conversion rates in groups 2 and 6 in Table I suggests a slight deterioration of the antigen in the latter stages of the work. It is submitted that this need only have been very slight, as the critical nature of the 2-Lf dose, either as a primary or as a secondary stimulus, is suggested at 1 and 2 and 5 and 6. The comparative value of groups 5, 6, 7, and 8, in any case, remains unimpaired owing to the simultaneous conduct of the work in these groups.

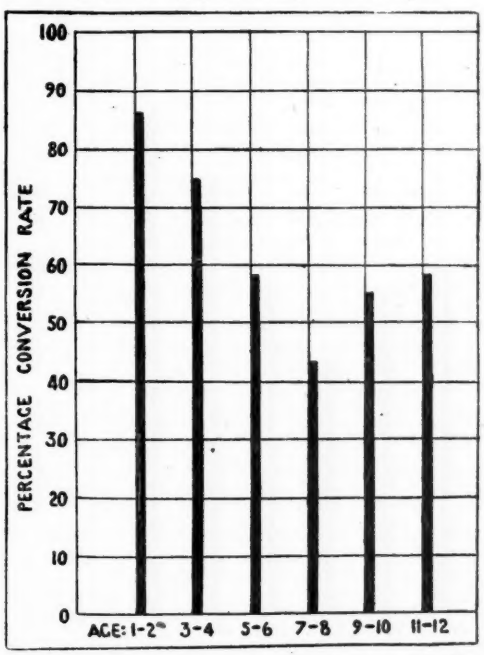
A slight difference in the average age may have some bearing on the better results in groups 7 and 8 than in 5 and 6, but this would not be sufficient to invalidate the general inferences to be drawn from these four conversion rates. That the age question is of some importance is shown later.

A repetition of this work with other samples of A.P.T. might demand the use of a rather larger or smaller number of Lf units in order to produce comparable results. It would probably be found that the necessary ratio between doses would fall somewhere near the limits suggested.

Age of Relative Non-immunizability

The last two columns of Table I show that, without exception, the average age of the post-immunization Schick-positive child is higher than that of the negative. Table III provides a study of 543 children injected with what proved to be insufficient dosage of unexpectedly low potency A.P.T. The subjects of these observations were drawn from Table I, with additions of other children from the same area. Two different antigens were involved; but as the phenomenon was obvious in both cases, they are presented on the same chart for convenience.

TABLE III.—*Relative Immunizability of 543 Children of Various Ages (1941–2). (Age in Two-year Periods)*



Antigens: A.P.T. (Squibb and Evans) in total dosage of 0.4 c.cm., given in two injections. Squibb Lf dosage = 8.4. Evans Lf dosage unknown, but less than 8.4.

The results in Table III indicate that in an area of low herd immunity the young subject is relatively easily immunized by a small amount of antigen. As the body weight rises, the immunity response to this amount of A.P.T. becomes weaker, in the absence of much basal immunity, until the most unsatisfactory 7–8 year age group is reached. Following this the curve rises somewhat, suggesting that the older children have experienced some degree of exposure to diphtheria infection.

This seems to compensate in part for the greater body weight, but the improvement in the 9–12 year group does not approach the conversion rates found up to the age of 4. Any results set forth in Table III are without significance unless the diphtheria rate in the population is also stated over the requisite period of years. This is given in Table IV, and it may be noted that such infective stimuli as may have been experienced by some of the older children are derived more from a longer risk of exposure than from any particular waves of high diphtheria incidence. The last diphtheria wave was in 1929–30, and this can hardly have any direct bearing on the immunity of any of the children mentioned in Table III, except perhaps for a few in the 12-year group It can only be observed that the epidemic (and possibly consequent high carrier rate) has left little or no favourable mark on these older children. For the rest of the age groups, since the diphtheria incidence has only on one occasion reached the figure of slightly over 1 per 1,000, the findings in Table III are likely to be representative of the relative immunizability of children of various ages in a fairly non-immune area. In such a district small body weight appears to be a more important factor in facilitating the production of active immunity in a high percentage of children than is that previous experience of diphtheria which is so important in congested urban populations.

If an area totally devoid of experience of diphtheria infection could be investigated it is surmised that essential antigen dosage would be more directly related to the actual weight of the subjects.

TABLE IV.—*Annual Diphtheria Incidence in the Population involved in Table III*

Year	Diphtheria Incidence per 1,000 Population	Year	Diphtheria Incidence per 1,000 Population
1929	5·87	1936	0·22
1930	3·31	1937	0·18
1931	0·81	1938	0·39
1932	0·72	1939	0·50
1933	0·59	1940	0·75
1934	1·13	1941	0·40
1935	0·79	1942	0·11

In 1935 a similar result was noted in the same area in a group of 2,323 children treated by means of three injections of T.A.M. (Bousfield and Nash, 1935). The work had been done in the previous five years, following the epidemic in 1929. The ease with which children under 5 years of age responded to treatment as compared with the older and heavier children was quite well marked even in this post-epidemic period when children of school age had probably an opportunity of coming more often into contact with infection. The strain of K.L.B. involved was unknown, but was possibly of a virulent type tending to produce clinical cases of the disease rather than to confer immunity by creation of carriers.

The phenomenon of relative immunizability can only be observed if the effects of using weak antigens or insufficient dosage are studied. When powerful antigens are used the failures are found to be spread over the various age groups, depending on the number and chance age of those subjects difficult to immunize who happen to be included in the series under investigation. Again, when using powerful antigens in sufficient dosage the number of failures is so small that it is difficult to collect enough post-immunization Schick-positive cases to render any significant age analysis possible.

Antigen Concentration

The volumes of first and second doses of A.P.T. that are suitable in practice have been much discussed. Table II, at *e*, suggests that the first and second doses may well be of equal Lf value. A standard dose of 0.5 c.cm. of the material for all injections, including re-immunizations, would be of great convenience. It is easily measurable, even in poor syringes, and slight loss of the fluid during administration would matter much less than when a small volume such as 0.1 or 0.2 c.cm. is used as the priming dose. Dangers of deficiency of this first dose have already been discussed. It would appear that 0.5 c.cm. of the present 50-Lf A.P.T. might be recommended as the standard dose, and this would be sound in the case of most small children. With the growing tendency to inoculate non-Schick-tested children of fairly mature age with A.P.T. the above dosage would lead to a number of fairly sharp and undesirable reactions in already immune or sensitive subjects. A.P.T. will improve in the future, as it has done in the past, in its liability to produce reactions. In the meantime there is something to be said for the issue of a substandard A.P.T., say of 30 Lf/c.cm., for use in older or non-tested children as two doses of 0.5 c.cm. The Lf dosage suggested has been investigated.

The following results (Table V) were obtained in London in a population which showed only 9% of naturally immune children among clinic attendants as a result of a complete system of pre-immunization Schick-testing. A number of batches of London County Council A.P.T. were used, and none of them was stored with any special precautions, so as to allow for such deterioration as might take place under some working conditions. The samples as prepared were stated to be in the region of 50 Lf or slightly more. At an interval of 28 days 227 Schick-positive children were injected with two doses of 0.3 c.cm. by the deep intramuscular route. Highly satisfactory results are shown at A. It has been possible to submit 70 of these children to a further Schick test one year after the initial negative post-immunization test. Only 2, or 2.9%, were found to have relapsed to the Schick-positive state.

TABLE V.—*Effects of Two 15-Lf and Two 10-Lf Injections at 28 and 14 Days' Interval. (London County Council A.P.T.)*

Group	No. of Cases	Av. Age (yrs.)	Dosage in c.cm.	Presumed Lf Dosage	Interval in Days	Number Post-Schick		Conversion Rate (%)
						Pos.	Neg.	
A	227	4·7	0·3 + 0·3	15 + 15	28	2	225	99·1
B	344	3·0	0·3 + 0·3	15 + 15	14	3	341	99·1
C	284	3·4	0·2 + 0·2	10 + 10	28	15	269	94·7
D	171	3·3	0·2 + 0·2	10 + 10	14	12	159	93·0

Interval between Injections

In view of the occasional convenience of employing a 14-day interval, as opposed to the theoretical advisability of using a longer one, a second group of children in the same area were inoculated with two 15-Lf doses of the same antigens, allowing only two weeks between injections. Conditions of work were comparable with those obtaining in group A, Table V, and reference to B shows an identical conversion rate in 344 children. The lower average age in group B is a factor which would favour a good conversion rate. Still, there seems to be evidence that, *when adequate dosage is used,* the 14-day interval may be employed satisfactorily if necessary.

The same antigens and conditions were applied to two further groups of children as two injections of 10 Lf units at 28 and 14 days' interval (Table V, C and D). In the case of this particular A.P.T. the latter results indicate that the dosage is barely sufficient to immunize that odd 5 to 7% which is probably so vital to a perfect immunization scheme. It will be noted that here again there is no significant difference between the conversion rates obtained by using 28- and 14-day intervals.

The following figures illustrate the advisability of using adequate total dosage, when seeking optimum results, if only a 14-day interval is allowed between injections. One series of children (group F) received 0.2 and 0.2 c.cm. of A.P.T., and another group (G) 0.2 and 0.5 c.cm. of the same antigen. To avoid difficulty due to difference in potency of any of the batches of London County Council A.P.T. employed, cases were treated alternately by one method or the other. The population and conditions were the same as those concerned in Table V, but the cases are from an additional series. All injections were given by the intramuscular route, and the interval between final injections and retests was approximately three months. All children were initially shown to be Schick-positive.

Group F (0.2 and 0.2 c.cm.; 14-day interval):
Cases post-tested, 454; positive, 26; conversion rate, 94.3%.
Average age of children in group, 2.8 years.

Group G (0.2 and 0.5 c.cm.; 14-day interval):
Cases post-tested, 344; positive, 8; conversion rate, 97.7%.
Average age of children in group, 2.6 years.

A conversion rate of just over 90% seems to be easily obtainable by a variety of methods and dosage combinations, but the

last 7 or 8% appears to contain most of those children who are difficult to immunize. These subjects seem to require appreciably greater stimulation than the majority of their fellows, and are thus probably in greater danger if they are attacked by diphtheria than is the class of child who responds more readily to treatment. For this reason the 3.4% better conversion rate shown by group G is important, and the need for adequate dosage when employing a short interval is suggested. The point is also illustrated by comparing B and D in Table V. All technique favouring a 100% conversion rate should be employed when possible, and this includes the 28-day interval. The full advantage of the longer spacing of injections would be apparent, as judged by the Schick test, only when a smaller dosage than that administered to cases in Table V was employed. Animal work, however, has clearly shown a better immunity response when the 28-day spacing of injections can be used.

Effect of Dilution of A.P.T.

Though dilution of A.P.T. for use in animal experiments is employed, I am not aware of any controlled investigation of this nature in the human subject. It was decided to find out if any variation in conversion rates was produced by giving the same Lf dosage of a given batch of antigen in dilute and concentrated form.

A.P.T. Burroughs Wellcome of 50-Lf value was employed. All children were previously shown to be Schick-positive, and the population was the same as that concerned in Table V. One group received a deep intramuscular injection of 0.2 c.cm., or 10 units, followed by a similar injection 28 days later. In the second group of children the same batch of antigen was diluted to exactly 2/5 strength with sterile normal saline immediately before use. This was administered as two injections of 0.5 c.cm. at a 28-day interval. Thus the Lf dosage given to the two groups was the same. Reference to Table VI shows that there is no significant difference in the conversion rates obtained. Thus if A.P.T. should be found to have declined in Lf value, it is perfectly reasonable to use it in certain circumstances, providing the Lf is known and the dosage adjusted accordingly. The Squibb A.P.T. used in Table I confirms this view. There is also some support for the idea of a substandard A.P.T. in the 0.5-c.cm. dosage, for use in older children or those whose state of immunity is unknown. After all, bacterial antigens are issued in different concentrations to suit circumstances.

TABLE VI.—*Effects of using Concentrated and Dilute A.P.T. (Burroughs Wellcome)*

No. of Children	Av. Age (yrs.)	Antigen Concentration	Dosage in c.cm.	Lf Units given	Post-Schick		Conversion Rate (%)
					Pos.	Neg.	
140	3·7	50 Lf/c.cm.	0·2 + 0·2	10 + 10	5	135	96·4
231	3·7	20 Lf/c.cm.	0·5 + 0·5	10 + 10	10	221	95·7

Effect of a Larger First Dose on Incidence of Local Reactions

If the employment of an initial dose of 15 Lf is considered, so as to ensure an adequate primary stimulus, it becomes important to determine whether local reactions are unduly more frequent or severe than when a priming dose of 10 Lf is used. Parents were asked the standard question, "There was no trouble with the arm after the last injection, was there?"

TABLE VII.—*Priming Dose of approximately 10 Lf (0.2 c.cm. of London County Council A.P.T.)*

Age Group	Total Cases	Reaction Complaint			
		Very Slight	Slight	Moderate	Severe
1–2–3	251	3	2	2	0 Severe and moderate reactions = 1·1%
4–5–6	118	1	0	2	0
7–8–9	27	0	1	1	1 Severe and moderate reactions = 4·7%
10–11–12	16	0	1	0	0
Total	412	4	4	5	1

Total reaction reported, 3·4%. Moderate and severe reactions, 1·5%.

Table VII was compiled from replies received. The number of cases is not large enough to reduce to percentages in some age groups, and the figures as obtained will provide more information. The table shows the results reported from a priming dose of 0.2 c.cm., or approximately 10 Lf units.

The same procedure was then adopted using an initial dose of 0.3 c.cm. of A.P.T. The results are given in Table VIII.

TABLE VIII.—*Priming Dose of approximately 15 Lf (0.3 c.cm. of London County Council A.P.T.)*

Age Group	Total Cases	Reaction Complaint			
		Very Slight	Slight	Moderate	Severe
1–2–3	289	2	2	0	0 Severe and moderate reactions = 0·7%
4–5–6	125	2	6	2	1
7–8–9	47	0	0	1	0 Severe and moderate reactions = 5·4%
10–11–12	27	2	2	2	1
Total	488	6	10	5	2

Total reaction reported, 4·7%. Moderate and severe reactions, 1·4%.

Comparison of Tables VII and VIII shows that reactions appear to be rather more frequent when the 15-Lf initial dose is used than when 10 Lf is employed, but the only cases of real significance are those experiencing moderate or severe reaction. The larger dosage shows a slightly greater tendency to produce local reaction in the older children. The figures appear to indicate that no real apprehension need be felt about employing the 15-Lf primary stimulus. All the children mentioned in Table VII and VIII were Schick-positive before injection, and thus showed a lower reaction rate than would occur when subjects of unknown Schick reaction received similar injections.

Conclusion

The convenience of a standard dose of 0.5 c.cm. of 30 Lf/c.cm. A.P.T. is not to be too lightly dismissed. It has been shown that the degree of dilution involved does not detract from the effectiveness of the antigen, and the Lf dosage suggested has been demonstrated to produce almost perfect results. In default of the availability of such a preparation, the use of two injections of 0.3 c.cm. of the ordinary 50-Lf A.P.T. at 28 days' interval is warmly recommended as probably the soundest procedure at present known, with due regard to avoidance of the production of excessive local reactions.

Summary

A carefully controlled investigation is described in which the necessary Lf dosage of A.P.T. has been studied, as opposed to discussion in terms of fluid volume of a highly variable antigen.

Information regarding the theory of essential dosage-balance is revealed. Results indicate that when using minimum (or suboptimal) quantities of A.P.T. the primary stimulus should consist of not less than about one-half or more than two-thirds of the total Lf units employed.

It is evident from Table I that the danger of failure to produce a satisfactory immunity lies most often in deficiency of the primary stimulus.

It is observed that when using minimal amounts of A.P.T. a better Schick conversion rate results when the larger of two unequal doses is administered first. This underlines the importance of providing an adequate primary stimulus.

An age group which shows relative resistance to immunization is described and the phenomenon discussed.

It is demonstrated in the human subject that there is no appreciable difference in the results obtained from injecting A.P.T. in concentrated or dilute form, provided that the number of Lf units given is the same in both cases.

A suggestion is made that a substandard A.P.T. of 30 Lf/c.cm. potency, to be used as two injections of 0.5 c.cm., might have great practical advantages. The efficiency of the Lf dosage thus suggested has been investigated, and found highly satisfactory even one year after the first negative post-immunization Schick test.

It is shown that *when adequate total dosage of A.P.T. is used* the short interval of 14 days between injections may be employed if necessary. This is discussed in the case of two doses of 15 Lf, two of 10 Lf, and also 10 Lf followed by 25 Lf.

The frequency and severity of local reactions following priming doses of 10 Lf and 15 Lf units have been investigated and comparisons made. Results indicate a slightly greater tendency to reactions when the larger injection is employed. It is considered that this is not of sufficient magnitude to preclude the use of a 0.5-c.cm. standard dose of a 30-Lf-potency A.P.T. This dosage should prove adequate for all injections, whether primary, secondary, or boosting. The practical advantage of the larger volume for syringe measurement and administration is stressed.

It is considered that the results recorded in the case of A.P.T. dosage may well have a bearing on the most effective usage of antigens in the case of other diseases.

I wish to express my gratitude to Dr. A. Anderson (M.O.H., borough of Heston and Isleworth) for many facilities, much helpful discussion, and the verification of statistical evidence; to Sir Wilson Jameson and Prof. G. S. Wilson for procuring further supplies of the correct batch of Squibb A.P.T., so essential for the main investigation; to the Wellcome Physiological Research Laboratories for generous supplies of A.P.T. of known Lf value; to Dr. Percival Hartley for estimation of Lf values of certain batches of A.P.T.; and to Sir John Ledingham, Dr. Hartley, Dr. G. F. Petrie, Dr. H. Schütze, and Dr. H. J. Parish for reading the manuscript and for helpful comment.

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DURATION OF ARTIFICIAL ACTIVE IMMUNITY AGAINST DIPHTHERIA

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The areas covered by this report comprise the Cuckfield Rural District, the Cuckfield Urban District, and the Burgess Hill Urban District. In 1936 one of us (W. B. S.) started a campaign to immunize all children between 1 and 15 years against diphtheria. In 1940 a report (cf. Stott and Duke, 1940) was published on this undertaking, which at the time had obtained unique success, particularly among the least accessible section of the population, the "under-fives." Now that the records for over six years are available the time seems ripe to attempt to find an answer to the oft-repeated question, by doctors and parents alike: How long does immunity last? Before presenting the actual figures it will be well to discuss certain points that materially affect their interpretation.

Although two of the districts are nominally urban, in neither of these do the conditions approach those obtaining in our big cities, where, as is well known, a considerable degree of natural immunity to diphtheria occurs among the children. The local incidence of diphtheria up to date (July 31, 1943) is as follows:

Incidence of Diphtheria

Council	1936			1937			1938			1939			1940			1941			1942			1943			Totals for 8 years		
	a	*b*	*c*	*a*	*b*	*c*	*ab*	*c*		*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*
C.R.D.C. ..	0	0	2[2]	2	1[2]	1	2	0	1	6[1]	5[1]	0	1	0	0	1	0	0	1[2]	1	0	0	0	0	5	10	9
C.U.D.C. ..	1	1	1	0	0	2	0	0	0	7	5	0	0	2	0	1	1	0	0	0	0	2[3]	3[3]	0	1	11	14
B.H.U.D.C. ..	0	0	1	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1

(*a*="Under-fives"; *b*=School-children; *c*=Over 16.)
[1] 4 *b* and 2 *c* in one cottage; 3 *b* previously immunized.
[2] 2 *b* and 2 *c* " ; 2 *b* " "
[3] In an institution.
None of the other cases had previously been immunized.

Total Rates per 1,000 Population

Council	1936	1937	1938	1939	1940	1941	1942	1943
C.R.D.C.	0·1	0·2	0·1	0·5	0·05	0·05	0·1	0
C.U.D.C.	0·2	0·1	0	0·9	0·1	0·1	0	0·6
B.H.U.D.C. ..	0·1	0·3	0	0·1	0	0	0	0

There was only one death—that of a non-immunized youth aged 17. From the above it is evident that cases of indigenous diphtheria are rare throughout the three areas.

Percentage of Children (1 to 15 Years) Immunized

Council	1936	1937	1938	1939	1940	1941	1942	1943
C.R.D.C. ..	Negligible	72	77	91	91	96	95	95
C.U.D.C. ..	"	64	69	92	92	95	97	97
B.H.U.D.C. ..	"	18	23	90	90	94	96	96

In Sept., 1939, occurred an event of considerable epidemiological importance—the sudden influx of mothers and children evacuated from the Greater London area. The majority of these children were unaccompanied by their parents, and by far the greater proportion of the "evacuees" were billeted on the local inhabitants. Since their first arrival the numbers have fluctuated, a definite rise occurring in 1941.

In the course of this report "natural immunity" denotes immunity gained without deliberate injection of antigen, the latter process being referred to throughout as "immunization." A "pre-Schick test" is one carried out before immunization; a "post-Schick," one done not less than three months after the end of the course. "Positive" and "negative" indicate respectively the presence and absence of a reaction—i.e., failure or success.

Procedure

In order to test sufficient numbers of children in schools scattered over a wide area it was necessary to modify the ordinary procedure. Each child who had at some time previous been immunized and proved Schick-negative received a toxin test only, and no control. At first, when the test was read the control was then performed on all reactors, but the number of pseudo-reactions so revealed was negligible and the control test was finally dropped from the routine (cf. Fulton *et al.*, 1942). It has been found advisable to read the test after seven days, and not earlier as sometimes recommended. All testing was carried out by one of us (H. L. D.). All positives immediately received a supplementary inoculation of antigen. The following points are to be borne in mind in examining the figures:

1. All the children had had at least one negative test not less than three months after the end of the immunizing course.

2. None is included whose *first* post-Schick test was positive. These primary failures are relatively very few in number (2%, see below), and all received at once a supplementary dose of antigen: in the overwhelming majority of cases this is sufficient.

3. Each child is counted in one year-group only.

4. All children in the 6- and 5-year groups, and many in the 4-year group, had received three injections of T.A.F. at intervals of 14 and 21 days. This antigen proved highly satisfactory, giving 98% successes. The others received A.P.T., the 2-year group mainly the Burroughs Wellcome brand. As Bousfield has so clearly shown, to use an unsatisfactory antigen is merely to deceive the public and play into the hands of the cranks.

Results

The results of the inquiry are as follows:

Years after End of Course	Total Tested	No. Positive	% Positive
6	579	105	18
5	164	41	25
4	588	91	15
3	522	65	12
2	354	14	4

Into this series may be inserted the result of testing, in 1941, 1,000 children two and a half years after immunization with T.A.F., 7% being found positive. As a basic comparison there is also the much greater number of routine tests applied to every child three to six months after the conclusion of its course, when only 2% were positive—an observation that at once disposes of the strange theory that immunization is ineffective in a diphtheria-free area. This last figure relates to both T.A.F. and A.P.T., the latter antigen producing slightly the better results. Apart, therefore, from the statistically inadequate 5-year sample, these figures indicate a steady loss of immunity with the passage of time, and the consequent importance of retesting all children some two years after the completion of their course of immunization. There is little difference between the sexes in their response to antigen. At the schools where the tests were carried out 51% were boys and 49% girls. Of the positives 58% were boys.

An incalculable factor in the interpretation of these figures is the degree to which natural immunizing processes operate in the community under observation. It is well known that among the children of large cities natural processes may result in a high proportion—50 to 70%—of school-children becoming naturally Schick-negative. Samples of the Greater London

evacuee children tested soon after their arrival in our areas yielded much the same results. In sharp contrast a small sample of local children tested at the outset of the campaign in 1936 showed an extremely low percentage of natural Schick-negatives, and among the "under-fives" local experience has failed to reveal any evidence of natural immunizing processes. This is indeed to be expected from the rarity of diphtheria and the essentially rural character of the environment. On the other hand, certain feebly positive children, when tested again six months or more later and without any further treatment, were found to have become negative. The small amount of toxin introduced during the test may contribute to this result, as also may intercurrent disease and fluctuations in the general health. But the considerable changes in the hygienic adjustments of the community that have taken place during the last few years can hardly have failed to affect the oecology of the diphtheria bacillus in these areas. Year by year as the campaign progresses a large body of potential carriers is forming among the locally immunized children, and this has doubtless already built up the naturally or artificially acquired level of immunity and thus serves as a buffer against the large-scale introduction of new sources of infection. It seems probable, therefore, that natural processes are at work, though probably to a limited extent, among our local children at the present time.

What they style the "carrier menace" is a favourite target for the opponents of immunization. These people seem unable to grasp that immunization does not confer protection directly against the bacillus itself, but against its toxin, which causes the symptoms. Once this result is attained the child is at liberty to develop, according to his resources, an antibacterial immunity. Naively enough, these leave-it-to-Nature enthusiasts, while roundly abusing the immunized carrier, alternately extol and conveniently ignore, according to the angle of their attack, the great body of naturally immune town children, all likewise potential carriers of the bacillus. They ignore, too, the value of a high carrier rate in a completely immunized child community as a beneficent factor in maintaining the immunity level.

It is evident that special importance attaches to post-Schick reactors, whether primary or secondary. We have always kept the cards of these children in a special section labelled "Post-Schick Positive," where they remain even after secondary treatment has rendered them negative.

There is no doubt that certain rare children are difficult to immunize and that success is adversely affected by tuberculosis, illness, and poor general condition at the time of treatment. There is also no doubt that local reactions are commoner after A.P.T. than after T.A.F., especially in children over 8 years of age and in girls with well-developed arms. Cold saline compresses are apparently the best treatment. The dosage we use is 0.3 and 0.5 c.cm. A.P.T., and a slightly smaller first dose in children over 8.

Summary

An account has been given of an investigation into the duration of artificial immunity against diphtheria in a country area with a child population (1 to 15 years) of 9,600, 95% of whom had been immunized.

Over 3,000 children were Schick-tested two to six years after completion of a course of immunization. None of these was positive when tested three to six months after the course.

The figures indicate that the number of treated children who lose their immunity to diphtheria increases steadily with the passing of time, rising from 4% after two years to 18% after six years.

The figures should be compared with the results obtained by the routine testing, three to six months after the completion of the course, of all inoculated children—i.e., 2% primary failures.

Certain factors having a possible bearing on the results are discussed, such as the number of notified cases of diphtheria from 1936 to July, 1943 (54), 30 of whom were under 16 years of age.

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Deaths from motor accidents throughout the United States in the first six months of 1943 totalled 10,030, a reduction of 41% from the total of the comparative period in 1941 before the outbreak of the war and 32% in 1942.

GUNSHOT WOUND OF THE INNOMINATE ARTERY

BY

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The following case of spontaneous arrest of haemorrhage from a through-and-through wound of the bifurcation of the innominate artery with resultant hemiplegia from cerebral ischaemia presents several interesting features.

Clinical History of Case

An American rear gunner aged 23 was injured in a plane by an enemy cannon-shell fragment at about 7.30 o'clock in the morning. He collapsed shortly after the injury, and was given first-aid treatment by his captain, who administered two tablets of benzedrine, which helped to revive him; morphine was thought to be inadvisable. A very difficult return journey ensued, with a "belly landing" and only one engine working; he was then conveyed nearly 30 miles by ambulance, to be admitted to hospital at 1 p.m.

On admission he was severely shocked; the front of his voluminous flying kit was soaked with blood, but there was no active haemorrhage. He was conscious, but had moments of confusion; he complained of a feeling of pins-and-needles in his left wrist and hand, which he could not move. There was a round wound half an inch in diameter just above the midpoint of the left clavicle, with some swelling in the deep tissues. Blood pressure was 90/?, and the pulse rate 48, irregular. There was no obvious haemothorax or paralysis elsewhere, but he was too shocked to undress, and resuscitation with serum was started.

One hour later a blood count showed 3,600,000 red cells and 67% Hb. Blood was now being transfused. At this time he was complaining of paraesthesia in the whole of the left arm, and in view of the left brachial monoplegia a provisional diagnosis was made of possible left brachial plexus lesion due to transverse passage of the shot. A radiograph taken through his clothes revealed a cuboidal metal foreign body, 1 c.cm. in size, behind the right side of the manubrium sterni at the level of the first chondro-sternal junction; this caused revision of the diagnosis to possible carotid arterial spasm with cerebral monoplegia. A general neurological examination was still not possible, but no abnormality was noted in the legs. The pupils were normal after allowing for the effects of morphine.

At 4 p.m. he was becoming increasingly confused and disorientated and was not responding to resuscitation, but no active haemorrhage was detected. A small dose of intravenous pentothal was given to enable his flying kit to be removed by the use of scissors and wire clippers in view of the use of electric warming devices. A radiograph of the chest now showed no abnormality. At 5.30 p.m. intermittent tonic contractions of the left arm occurred and his left leg was partly paralysed. He was becoming increasingly restless and at times lapsed into coma. His pupils were dilated and reacted sluggishly; the right disk was paler than the left and the vessels appeared somewhat contracted. There was an extensor plantar response on the left, with ankle clonus; abdominal reflexes were absent, and it was obvious that a progressively severe cerebral ischaemia was present over the right hemisphere. Blood pressure was 110/45; pulse 80.

It was evident that unless the carotid arterial spasm could be relieved the cerebral damage would be fatal: no carotid or temporal pulse could be detected on the right side, and arteriectomy or novocain blockage of the periarterial sympathetics was considered justifiable.

Operation

This was performed at 8 p.m. under intratracheal anaesthesia. A transverse incision above the right clavicle enclosing the wound, with a vertical extension up the sterno-mastoid muscle, gave adequate exposure of the common carotid. The sheath was infiltrated with blood and the artery was small in calibre owing to spasm. It was traced down, and further exposure was obtained by medial reflection of the sterno-mastoid and pretracheal muscles. The wound-track was traced downwards to the back of the sterno-clavicular joint, and the common carotid was visible up to the bifurcation of the innominate; it was still in spasm though a slight pulsation was felt. At the innominate bifurcation a blue-domed clot was seen on the anterior surface, and it was evident that a puncture had occurred at this site. The innominate artery had to be controlled, and accordingly the inner third of the clavicle was divided and resected with a small portion of the manubrium sterni. Exposure of the innominate was now sufficient to allow it to be gently cleared for the passage of a tape ligature, but at this stage the clot shifted and severe haemorrhage from the bifurcation had to be controlled

by digital compression while the tape was passed. The innominate was compressed while the tape was tied, but this failed to control the bleeding, as the wound was exactly at the bifurcation. Tapes had therefore to be applied to the common carotid and subclavian arteries to maintain haemostasis. Inspection then revealed the presence of an exit laceration of the posterior wall of the innominate artery just below the bifurcation. The wound was bathed with 2% sodium citrate solution and the anterior perforation closed with paraffined fine silk sutures on arterial needles. Suture of the more ragged posterior tear was more difficult, and after release of the tape on the carotid the posterior repair leaked: a piece of muscle was applied in support of the suture, but at the second attempt at release the vessel tore further and suture had to be abandoned. Resection of the bifurcation was therefore carried out after applying double ligatures of thick silk to the innominate, common carotid, and subclavian arteries; as a further precaution against the arterial spasm novocain was injected into the adventitia. Sulphathiazole cream was inserted into the wound, which was rapidly closed.

It was interesting to note that the blood pressure rose from 120 during the preliminary clearance of the vessels to 146, 160, and 184 mm. Hg during the successive ligations of the innominate, carotid, and subclavian arteries; while the pulse rate varied from 110 to 128, 150, and 160 during the corresponding phases.

No search for the foreign body was made. Blood transfusion had been continued throughout the operation and afterwards. Pulmonary oedema developed during the night, and the patient never regained consciousness, though he became very restless. Paralysis of the left side remained, but the right limbs moved. Reflexes were sluggish or absent. The right radial pulse was feebly detected on the following morning, but no temporal pulse was present.

Death occurred 16 hours after the operation; no post-mortem examination was obtainable.

Discussion

Cerebral symptoms, usually hemiplegia, followed in 29.6% of 27 cases of ligature of the common carotid artery for gunshot wounds in the last war (Makins, 1919) only 1 out of the 8 cases presenting cerebral symptoms returned to a normal state.

In the present case the bifurcation of the innominate artery was the site of the rupture; the cerebral symptoms began within five hours of the injury, and may therefore be ascribed to spasm of the carotid, aided presumably by some intramural clotting and by general anaemia and low blood pressure. The effect of low blood pressure in producing organic cerebral damage has been dramatically demonstrated by Poppen (1939), who found that if the blood pressure was corrected by intravenous transfusion before ligation of the anterior cerebral artery no prolonged coma resulted, whereas a fatal coma was invariable if at the moment of ligation the pressure was subnormal. Babinski remarked that an obliterated artery is a sympathetic nerve and that it is better to divide a main artery than to ligate it in continuity. Leriche (1940) postulates "cross-road zones" at the bifurcation of the main arteries, at which sympathetic vasoconstrictor impulses are initiated; he advocates division of the vessel between ligatures and injection of a local anaesthetic into the periarterial sheath.

In the case now reported a lesion of the common carotid was thought most likely as, although the foreign body was behind the manubrium, damage to the innominate with survival was considered impossible; spasm of the carotid was obvious, but similar spasm of the subclavian supply zone was not detected. Relief of the carotid spasm and the prevention of reactionary haemorrhage were considered to warrant operative intervention.

The innominate artery has been tied on many occasions for aneurysm: Sir William Wheeler (1942) reported a case of ligation of this vessel for traumatic subclavian aneurysm in 1932, and estimated that up to 1942 there had been about 70 cases of ligation for aneurysm; Ballance (1921) reviewed 57 cases, with 19 recoveries. Wheeler (1932) advocated division of the inner two inches of the clavicle, together with partial division of the right upper quarter of the manubrium sterni with retraction of the clavicle upwards and to the left; in the present case a resection of the clavicle at the sterno-clavicular joint afforded reasonable exposure. Wheeler used three catgut ligatures, but Reid (1934) preferred stout silk and disliked the presence of a third coapting ligature for fear of erosion of the vessel wall; in this he agreed with Halsted, whom he quotes at length concerning eleven essential points in the technique of arterial ligation. For large arteries it is agreed that temporary compression before tightening the ligature is essential in order to prevent intimal rupture.

Experimental work by Isenberger and Carroll (1939) showed that pedicled muscle flaps wrapped around incised wounds of carotid and femoral arteries of dogs caused effective haemostasis and permanent healing, with patency of the vessel. The muscle was opposed to the wound in the artery for about ten minutes or sutured around as a cuff without stitching to the vessel wall: endothelial lining regenerated and thrombosis did not occur when living pedicle grafts of muscle were employed. It is therefore interesting to speculate whether such treatment would be justifiable in dealing with the lesion now described; but it seems likely that in the presence of a bullet-wound contusion and rupture satisfactory adherence of the graft would not be feasible, and clot formation had already started. The experimental conditions might not obtain in the severe through-and-through wound described, and the arterial spasm would not be relieved.

Summary

A patient temporarily survived a through-and-through gunshot wound of the bifurcation of the innominate artery, and spontaneous arrest of haemorrhage occurred.

Traumatic arterial spasm of the common carotid artery resulted in rapidly progressive contralateral hemiplegia, which demanded an attempt at operative relief.

Attempted arterial suture of the injured bifurcation having failed, it was necessary to perform triple ligation of the innominate, subclavian, and common carotid arteries to ensure haemostasis. Resection of the artery was performed to interrupt the sympathetic pathways.

A brief commentary on arterial ligation and resection is included, with special reference to ligation of the innominate artery.

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TUBERCULOSIS IN LONDON

BY

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This brief note carries forward for another year the account given in an earlier issue (Daley and Benjamin, 1942) of the effect of the impact of war upon the incidence of tuberculosis in London. The statistics of the notifications of new cases in 1942 are as follows:

TABLE I.—*New Cases of Pulmonary Tuberculosis notified in London (Administrative County), 1938–42*

Age Group	1938		1939		1940 (a)		1941 (a)		1942 (a)		
	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	Ratio to 1938 (%)
0–4	105	0·42	76	0·40	60	0·53	104	1·64	101	0·73	174
5–14	228	0·42	161	0·39	103	0·55	198	1·74	223	0·95	226
15–24	1,484		1,353		1,130		1,150		1,210		
25–64	3,262		2,917		2,592		2,631		2,548		
65+	224	1·52	236	1·43	202	1·42	250	1·89	225	1·97	130
Not stated	2		24		18		24		26		
Total	5,305	1·31	4,767	1·26	4,105	1·33	4,357	1·87	4,333	1·80	137
Ratio to 1938 (%) ..		100		96		102		143		137	

(a) Excluding non-civilians.

TABLE II.—*New Cases of Non-pulmonary Tuberculosis in London (Administrative County), 1938–42*

Age Group	1938		1939		1940 (a)		1941 (a)		1942 (a)		
	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	Ratio to 1938 (%)
0–4	142	0·57	112	0·59	96	0·85	129	2·03	121	0·88	154
5–14	253	0.47	200	0·48	146	0·78	148	1·30	204	0·87	185
15–24	272		217		162		172		190		
25–64	346		302		249		211		241		
65+	40	0·20	26	0·17	24	0·16	40	0·20	32	0·23	115
Not stated	—		2		4		4		7		
Total	1,053	0·26	859	0·23	681	0·22	704	0·30	795	0·33	127
Ratio to 1938 (%) ..		100		88		85		115		127	

(a) Excluding non-civilians.

The rates for children are based upon small numbers, and too much importance should not be attached to the actual values, but it is clear that there has been improvement compared with 1941. It has to be borne in mind that in the latter part of 1941 and throughout 1942 the child population was augmented by returning evacuees, improved in health by their stay in the country. This movement probably increased the "exposed to risk" without proportionately increasing the number of new cases, and thus tended to reduce the case rate. The improvement cannot be attributed wholly to this factor, however, and it is probable that the actual risk of pulmonary infection was reduced by the substantial decrease in shelter life.

The incidence of new cases among adults continues to increase, but at a smaller rate. The undiminished pressure of war production, the effects of the black-out on ventilation, and the shortness or absence of holidays no doubt all contribute to the upward trend.

The tuberculosis mortality was considerably lower in 1942 than in 1941. The figures are shown below. Dr. Percy Stocks (1942) has already referred to the probability that the high mortality of 1941 has temporarily reduced the proportion of advanced cases within the tuberculous population, and that the mortality may be expected to rise again when the increased incidence of active disease which occurred in 1940–1 begins to influence the death rate.

TABLE III.—*Deaths from Pulmonary Tuberculosis in London (Administrative County), 1938–42* (a)

Age Group	1938		1939		1940		1941		1942		
	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	Ratio to 1938 (%)
0–4	30	0·12	15	0·08	22	0·19	41	0·65	22	0·16	(b)
5–14	25	0·05	16	0·04	24	0·13	25	0·22	17	0·07	(b)
15–24	459		447		454		432		376		
25–64	1,863	0·77	1,922	0·83	1,965	0·95	1,827	1·16	1,534	1·05	136
65+	213		250		222		227		215		
Total	2,590	0·64	2,650	0·70	2,687	0·87	2,552	1·10	2,164	0·90	141
Ratio to 1938 (%) ..		100		109		136		172		141	

(a) Non-civilian deaths excluded from outbreak of war.
(b) Differences 1938/42, having regard to small numbers of deaths, are not statistically significant.

TABLE IV.—*Deaths from Non-pulmonary Tuberculosis in London (Administrative County), 1938–42* (a)

Age Group	1938		1939		1940		1941		1942		
	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	Ratio to 1938 (%)
0–4	88	0·35	64	0·34	64	0·57	92	1·45	56	0·41	(b)
5–14	59	0·11	38	0·09	42	0·23	62	0·55	28	0·12	(b)
15–24	66		75		75		73		66		
25–64	113	0·06	103	0·06	109	0·08	99	0·09	103	0·10	167
65+	21		22		28		17		30		
Total	347	0·09	302	0·08	318	0·10	343	0·15	283	0·12	133
Ratio to 1938 (%) ..		100		89		111		167		133	

(a) Non-civilian deaths excluded from outbreak of war.
(b) Differences 1938/42, having regard to small numbers of deaths, are not statistically significant.

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Medical Memoranda

Trichlorethylene and Trigeminal Anaesthesia

Trichlorethylene in the form of trilene has proved to be a useful aid to successful anaesthesia. The following case reports of trigeminal anaesthesia after the administration of trilene are thought to be worth publication in view of the lack of reference to this complication.

CASE REPORTS

Case 1.—A married woman aged 32 was examined under anaesthesia and dilatation of cervix and curettage were carried out on May 17, 1943. Premedication was by omnopon gr. 1/3 and scopolamine gr. 1/150, given 1½ hours before operation. Anaesthesia was induced with N_2O and oxygen (McKesson). Trilene was added, using the CO_2-absorption technique. The induction and operation lasted 20 minutes. Recovery from the anaesthetic was without incident. There was neither sickness nor vomiting. Soon after awaking the patient complained of tightness of the skin of the face. The next day she found she could not eat her first solid meal. She was unable to feel the food in her mouth. The skin from the chin to near the crown of the head and from ear to ear was numb. The nose was "dry," and the eyes "felt screwed up and tearless." On Nov. 1 the anaesthesia of the face still persisted. The buccal anaesthesia was less. The corneal reflexes were absent. The nares were dry. The patient is now very well, but the numbness of the face is a "nuisance." Chewing is difficult, as she often bites the side of the mouth. The eyes "feel screwed up and fixed."

Case 2.—Hysterectomy was performed on June 17, 1943, on a woman aged 46. Premedication was by omnopon gr. 1/3 and scopolamine gr. 1/150, 1½ hours before. Anaesthesia was induced with nitrous oxide and oxygen (McKesson). Trilene was added, using the CO_2-absorption technique. As relaxation was poor, ethyl ether was substituted for the trilene. The induction and operation lasted nearly an hour. The patient recovered from the anaesthetic without incident except for some retching. She had a mild cystitis. On the second day after the operation she complained of stiffness of both lips, numbness about the mouth, and numbness of the tip of the tongue and the gums. Feeding was difficult. The numbness spread over the face, nose, and forehead. The eyes felt "as if they were closed and stiff." By Oct. 31, 1943, the anaesthesia of the face had improved somewhat. There was still numbness of the buccal mucous membrane: the corneal reflexes were absent; the nares were dry; and the patient talked with a slight lisp. She is quite well, but is very conscious of her disability.

Case 3.—A single woman aged 46 underwent ligature and injection of the saphenous veins on July 16, 1943. I had previously anaesthetized her twice with nitrous oxide and oxygen and once with ethyl ether by the endotracheal method. Before the operation on July 16 premedication with omnopon gr. 1/3 and scopolamine gr. 1/150 was given. Anaesthesia was induced with nitrous oxide and oxygen (McKesson). Trilene was added using the CO_2 absorber. The induction and operation lasted 30 minutes. It was not a "sweet" anaesthetic. The breathing was short and snappy. Cyanosis was evident. The patient's condition was perfectly satisfactory until she began to regain consciousness. She was violently sick, vomiting frequently for 3 days. She felt "completely knocked out," and had a "vile" headache, which lasted 3 weeks. Numbness of the face appeared immediately, and extended over the trigeminal area. The tip of the tongue and the buccal mucous membrane were insensitive. Feeding was very difficult, as fluid simply ran out of the mouth. Eventually the patient discovered she could feed herself by the aid of a mirror. There was loss of secretion in the nares. The eyes were dry, and the corneal reflexes were absent. On Oct. 21 the patient's condition had improved. She now eats in the normal way; lacrimation has reappeared; she talks with a lisp; and there is still no secretion in the nares. The face is numb, but she is sensitive to cold winds. Corneal reflexes are absent.

There is no doubt that the unfortunate sequela in each of the three cases is a bilateral trigeminal anaesthesia following on trilene administration. This view is supported by Prof. Geoffrey Jefferson, to whom I am indebted for examining Case 3. It is known that trigeminal anaesthesia from trichlorethylene has occurred previously (Langton Hewer). My cases seem to support Striker's theory that in the treatment of tic douloureux with trichlorethylene the mitigation of the pain is due to a phase of analgesia. After several months these three cases show the same degree of residual symptoms—namely, numbness, loss of corneal reflexes, dryness of the nares, and lisping. It seems to

be the Gasserian ganglion that is affected by the trichlorethylene. I have used trilene for the past twelve months in a variety of cases. Apparently the trigeminal anaesthesia bears no relation to the dose of trilene administered, and there is no method of testing the susceptibility of a patient.

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Intraperitoneal Rupture of a Wilms Tumour

The interest of the case described below is the rapid and unusual course following the first symptoms and the spontaneous rupture into the peritoneal cavity, probably caused by haemorrhagic disruptions. Prof. Grey Turner (*North Engl. clin. J.*, 1912, p. 49) reported the case of a woman aged 49 who on the evening before consultation was seized with severe abdominal pain while walking. The next morning the pain was unabated and she had a temperature of 103°. On examination a swelling in the position of the gall-bladder was found. A diagnosis of impacted calculus in the cystic duct was made. At the operation the lump proved to be a growth in the upper pole of the right kidney. The kidney was removed; it contained an encapsuled soft tumour, like brain tissue, which was very vascular and was largely occupied by blood-clot, the result of recent haemorrhage into its substance.

In the case which I describe, one concludes that the spontaneous rupture, while the child was asleep, was due to the very rapid growth and haemorrhage into its substance.

CASE REPORT

A girl aged 6 was admitted to hospital as an emergency case. She had been awakened the previous night by an attack of pain in the right side which made her scream out. She vomited once and had an action of the bowels. Her mother noticed that her abdomen was distended. She had complained of pain in the right side on one occasion two months previously, otherwise she had been quite healthy.

Examination on admission revealed marked pallor of the skin and mucous membranes, and the child was restless, thirsty, and complained of pain in the right side. The pulse rate was 148, the respirations 44, and the temperature 97.6° F. The abdomen was distended and tender all over, and contained a large quantity of free fluid. A mass dull to percussion and fixed was vaguely palpable in the right loin. The liver was not palpable, neither was the spleen. There was no lymph-gland enlargement. The chest moved well on respiration and the breath sounds were normal. There was no murmur in the heart sounds. A catheter specimen of urine was normal. The blood count was as follows: R.B.C., 3,010,000; Hb (7.0 g. %), 48%; C.I. 0.8; W.B.C., 22,700: polymorph. neutrophils 90%, lymphocytes 7.5%, monocytes 2.5%. Blood group, O (IV).

A diagnosis of intraperitoneal haemorrhage was made, and while preparing for a laparotomy a blood transfusion was started.

Operation.—The abdomen was opened by a right paramedian incision. As soon as the peritoneum was reached the free fluid in the peritoneal cavity was seen to be dark in colour. When the peritoneum was opened copious quantities of blood-stained fluid, blood, and blood-clots escaped. Mixed with this was material which had the colour and consistency of very soft brain tissue. A very friable tumour the size of a large orange was found in the position of the right kidney, and it had ruptured into the peritoneal cavity. The child's condition had deteriorated rapidly when the peritoneum was opened, and owing to the hopeless local condition the abdomen was closed. The patient died an hour after returning from the theatre.

Necropsy.—The laparotomy findings were confirmed. There was a soft necrotic mass, of the size stated above, projecting from the upper pole of the right kidney, haemorrhagic and extremely friable. It had not invaded the renal pelvis. The suprarenal glands were both normal. No other lesion was found, and there was no evidence of metastases. Microscopical section of the tumour showed the typical Wilms tumour structure—a combination of undeveloped renal tubules with a matrix of embryonic spindle and round cells. A number of undeveloped glomeruli were also present.

I am indebted to Dr. A. G. Watkins, paediatrician to the Cardiff Royal Infirmary, for permission to publish this case.

CLIVE H. TANNER, F.R.C.S.,
Surgical First Assistant, London Hospital.

H. H. Ash and J. L. Arbogart (*J. Indiana St. med. Ass.*, 1942, **35**, 562) record their observations on 21 cases of infectious mononucleosis seen within a two-year period at the Lafayette Home Hospital. The commonest symptoms were sore throat, malaise, adenitis, and fatigue. Leucocytic changes were characteristic in all cases, the diagnosis being confirmed in 15 cases by the Paul-Bunnell sheep-cell test. Only 3 mild cases of splenomegaly were found. The authors emphasize the importance of conjunctivitis as a symptom.

Reviews

WALTER REED AND YELLOW FEVER

Memoir of Walter Reed: the Yellow Fever Episode. By Albert E. Truby, Brigadier-General, United States Army (ret.). (Pp. 239. $3.50.) New York: Paul B. Hoeber, Inc. 1943.

The story of the United States Army Yellow Fever Board under the leadership of Walter Reed, which began its work in Cuba in June, 1900, and before the end of the year had demonstrated conclusively the role of the mosquito *Aëdes aegypti* in the transmission of the disease, has been told on a number of occasions. The book under review gives another account of this epoch-making discovery, but from the pen of an onlooker who, though not actually taking part in the investigations, was nevertheless closely associated with them and intimately acquainted with the members of the Board and the many others who made contributions in one way or another to the success of the undertaking.

The author begins his story with an account of his experiences before the Army Medical Examining Board in 1898, when he was a candidate for the U.S. Army Medical Corps. This was an ordeal well calculated to disconcert any but the toughest and most self-reliant of aspirants. Soon after his admission to the corps he was posted to the army of occupation in Cuba when that country was formally handed over by the Spaniards to the United States on Jan. 1, 1899. There he had ample opportunity to observe the ravages of such diseases as typhoid fever and malaria, and finally yellow fever, which broke out in the following year. The veteran Carlos Finlay, who clung tenaciously to his opinion that yellow fever was carried by mosquitoes in spite of his own failure to transmit it experimentally, was there and rendered signal service in diagnosis and treatment. Other experts, including Gorgas, Agramonte, Pinto, and Lazear, were also present, the majority of them being confirmed disbelievers in Finlay's theory. Here there was a great opportunity for the study of the aetiology of yellow fever, and, influenced by Walter Reed, Surgeon-General Sternberg persuaded the War Department to appoint the board consisting of Walter Reed, Carroll, Agramonte, and Lazear, which started its work at the Columbia Barracks, Quemados, on June 25, 1900. Reed first directed his attention to the claims of Sanarelli that his *Bacillus icteroides* was the cause of yellow fever. These were quickly exploded, and the way was then clear for the study of mosquito transmission. This was first effected by Lazear, who produced the disease in himself and two volunteers while Reed was temporarily absent in Washington. The death of Lazear had a profound effect on the other members of the board. On Reed's return he found that though there was little doubt that mosquito transmission had actually been effected there was the possibility that, owing to incomplete isolation of those experimented upon, other sources of infection had not been excluded. There were loopholes upon which the critics of the theory, of which there were many, were sure to seize. Reed quickly planned and organized experiments which would be beyond criticism, and established once for all the correctness of Carlos Finlay's hypothesis. On Dec. 10, 1900, Reed wrote to the author informing him of the success of his experiments, and making the statement, "The theory is all right!"

This romantic story as told by General Truby in his *Memoir of Walter Reed* makes fascinating reading, not only because the author is a good story-teller but because he throws much new light upon the great discovery of mosquito transmission of yellow fever—a discovery which must ever rank in importance with that of the mosquito transmission of malaria established shortly before this.

FRACTURES AND JOINT INJURIES

Fractures and Joint Injuries. By R. Watson-Jones, M.Ch.Orth., F.R.C.S. Volume I; third edition. (Pp. 407; illustrated. 75s. per set of two volumes.) Edinburgh: E. and S. Livingstone. 1943.

A third edition in three years is evidence that this work has received the appreciation which it fully deserves. Its division into two volumes has been necessitated by the rapid development of the subject. It has been brought fully up to date, and the work which this has involved can be appreciated only

by those who have followed the rapid advances in the treatment of fractures which have resulted from war conditions.

The first two chapters are devoted to a general discussion of the repair of fractures and to the causes of non-union, and they state with great originality of outlook facts which are far too little appreciated. Skeletal traction has placed in the surgeon's hands a most useful method, but the author shows only too clearly how its excessive use may entirely prevent the union it is intended to achieve. Every surgeon understands the importance of adequate immobilization, but perhaps few realize how rotation may occur in an apparently perfect splint, and still fewer how rotation may be overcome.

The chapter on avascular bone necrosis is a superb essay on a subject which only recently saw the light of day, but which explains many of the failures of the past in treating such important fractures as those around the head of the femur, as well as the disappointing results that have sometimes followed the reduction of a simple dislocation. The author explains on these grounds such varied conditions as Perthes's disease of the hip, necrosis of the carpal bones, and osteochondritis dissecans, and he clinches his argument with illustrations which leave no doubt whatever as to its validity.

The diagnosis of fractures is most ingeniously illustrated by double *x*-rays, one of which is concealed by a paper flap until the reader has fallen into the trap prepared by the other. Each case is thus converted into a problem, and a lesson is indelibly impressed upon the reader's mind. At the present time the chapter on open and infected fractures has a very special importance, and it is astonishing that the author has compressed so much into so small a compass. It is profusely illustrated with coloured photographs which give it a realism otherwise unattainable.

The whole volume is a splendid achievement and a wonderful tribute to the enterprise and resource of the author. It is a fully documented account at first hand of the very latest methods, and, while to those engaged in handling war injuries it is indispensable, there are few surgeons who will not find it full of interest.

REHABILITATION OF THE MAIMED

Rehabilitation of the War Injured: A Symposium. Edited by William Brown Doherty, M.D., and D. D. Runes, Ph.D. (Pp. 684; illustrated. $10.00.) New York: Philosophical Library Inc.

Rehabilitation is neither a branch of medicine nor a method of treatment: it is a new and enlarged conception of our duty as doctors towards our patients, a shifting of the finishing-post of treatment from one side to the other of that vague no-man's-land called convalescence. How then can we write books about it except in the most general terms, and then chiefly from the point of view of social medicine? This book is an example of what happens when the subject is treated otherwise. Individually the papers comprising it are excellent—sound, first-rate, up-to-date stuff by unquestioned authorities, and for the most part well written. But what strange bedfellows! Speech training, reconstruction of the tip of the nose, arthroplasty of the hip, hydrotherapy, exercises for the tuberculous, immersion foot, and workmen's compensation—to take a random few. It needed real American breadth of vision and ingenuity to find a reason for assembling such a mixed bag in one volume.

Nine-tenths of the book is highly specialized writing: over 200 pages (or nearly one-third of the whole) are concerned with pure plastic surgery, and might have adorned any volume on that subject. Where the book does deal with rehabilitation in a general way it is excellent, as in head injuries and orthopaedic injuries. It is a symposium of papers published in this country and in America; the papers on rehabilitation are nearly all from here and those on plastic surgery mostly American.

Notes on Books

Through the courtesy of Dr. J. Tylor Fox, medical superintendent of the Lingfield Epileptic Colony, who collaborates in England with the International League against Epilepsy, we have received a copy of the issue dated December, 1942, of *Epilepsia*, the official journal of the League, which is printed in America by the George Banta Publishing Company of Menasha, Wisconsin. The bulk of this number is given up to a record, by Dr. William G. Lennox of Boston, of contributions to epilepsy in 1940. His list includes 221 publications and 260 authors. The bibliography contains 25 titles dealing with the clinical use of sodium diphenylhydantoinate (trade names: dilantin sodium in the U.S.A., and epanutin in Europe); the great majority of these reports are favourable. Electroencephalography appears in 18 articles listed.

The Board of Education has issued a revised edition of Dr. ANNA BROMAN'S *Simple Health Hints* (H.M. Stationery Office; 3d.). It comprises sensible notes for Youth Group Leaders wishing to give short talks on practical health education to members of Youth Groups. As Dr. G. A. Auden points out in a brief foreword, these notes, condensed to bring together as many facts as possible within small compass, point the way to health; but facts, however interesting in themselves, are but the dry bones. The real function of the teacher is so to clothe them, with example and illustration, that they may live. Dr. Broman has handled her material with great discretion.

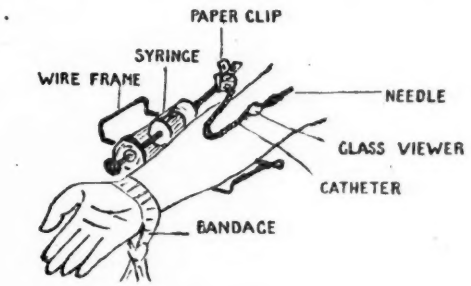
Preparations and Appliances

A SIMPLE METHOD FOR CONTINUOUS INTRAVENOUS ANAESTHESIA

Major R. SHAW, R.A.M.C., India Command, writes:

The difficulties in giving continuous intravenous anaesthesia have been as follows: (1) The elaborate apparatus required, such as continuous drop or special syringes; (2) blocking of the needle with blood; (3) difficulties in refilling the syringe. For over two years I have used the following simple apparatus, which can be found in a doctor's surgery. The idea is not mine, but seems to be little known, and it should be of use to doctors generally.

Apparatus consists of a syringe, narrow-bore rubber tubing, a glass viewer, a needle, and, most important of all, a small spring paper-clip. A 20-c.cm. syringe is used. The rubber tubing is found in a No. 3 soft rubber catheter with the ends cut off, the bell end being useful to fit over the butt of the needle. The glass viewer is drawn from a piece of glass tubing



to the smallest size convenient to fit the catheter. Thus we have: needle, bell end of catheter, glass viewer, the catheter, then the syringe, connected in that order. A piece of stout wire, bent into a rectangle 5 in. by 3 in. with the short sides bent up, put under the arm provides a rack and prevents the syringe rolling off the table or pillow.

Method of Use.—The needle is inserted into the vein and steadied with a piece of adhesive tape, and the arm is secured by a bandage around the wrist and tied below to the table. The needle is known to be in the vein by withdrawing a little blood into the viewer. Then the injection is commenced until the required depth of anaesthesia is obtained. Then, while still injecting the paper-clip is applied to the tubing, thus ensuring that blood does not enter the needle and obstruct it by clotting. With the clip in place the syringe may be removed for refilling. Any slight movement of the arm is not likely to disturb the needle.

Since using the paper-clip I have had no trouble with blocked needles. I strongly recommend pentothal for continuous anaesthesia, as the hexobarbitones do not give such a quiet and deep anaesthesia. It is important to premedicate adequately with morphine and hyoscine, or omnopon and scopolamine if available. Using the above method appendicectomies, partial thyroidectomies, plastic work generally, and peripheral neurosurgery have been done: operations lasting 2 to 3 hours and sometimes longer have been performed without any troubles, and with every satisfaction to the patient.

My thanks are due to Major C. L. Heanley for his help and permission to submit this article.

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IMMUNIZATION AGAINST TUBERCULOSIS

The long and chequered history of attempts to immunize against tuberculosis is largely a record of failure. Subtract those attempts which were curative, leaving only those in the more rational and promising sphere of prevention, and the picture is less discouraging, though much of it is questionable evidence. From the experimental point of view the facts are clear: it is perfectly possible to increase the resistance of animals to infection. Even a simple heat-killed vaccine will do this to some extent, and perhaps dead vaccines prepared in other ways are somewhat better. A vaccine made from living but attenuated bacilli is more effective, and the mass of evidence testifying to the immunizing power of B.C.G. in animals is now overwhelming. Still more effective—for all this is a matter of degree—is a living vaccine made from Wells's vole tubercle bacillus, judging by the few experiments made by Wells[1] himself in guinea-pigs and by the late Stanley Griffith and Dalling[2] in calves before the war interrupted these studies. The degree of resistance achieved in these experiments was striking, amounting in calves almost to full immunity, and it encourages the liveliest hopes for the future of this method. Apart from its apparently greater efficacy, a vole bacillus vaccine has the important advantage that this organism is not a natural parasite of man or of cattle. Its virulence does not need to be artificially reduced, nor is there any danger of an increase in pathogenicity or of such a diminution as to reduce its immunizing power: it need only be maintained in its natural host to preserve its existing properties.

There is no *a priori* reason why these findings should not be applicable to man, and in fact human vaccination with B.C.G. has been extensively practised, though hardly at all in this country. Whether our indifference or disapproval is merited or not, the subject needs ventilation once more, and the Tuberculosis Association is to be congratulated on the meeting to discuss this matter which was held on Nov. 19: a report of its proceedings appears on p. 722. London is now probably the most cosmopolitan city of all time, and affords the opportunity of assembling speakers from many different countries without the travelling which must precede an international congress. This meeting was thus enabled to hear first-hand accounts of what is being done in Norway, Canada, and the United States; unhappily there was no representative of France. Norwegian achievements in the sphere of tuberculosis control are well known: we owe to them recognition of the fact that tuberculin-negative entrants to the nursing profession have a far greater liability to develop tuberculosis in the course of their training than the tuberculin-positive. The voluntary immunization of tuberculin-negative nurses with B.C.G. was begun as long ago as 1926, the vaccine being given subcutaneously and later intradermally. Among the vaccinated the annual incidence of tuberculosis has been 2.6% and the mortality from it 0.2%; the corresponding figures for controls (tuberculin-negative on entry and non-vaccinated) are 17.6% and 1.8%. Tuberculin-negative medical students have been given the same opportunity; the incidence of tuberculosis among the non-vaccinated has been 4.3% and among the vaccinated 1.2%. This effort has been by no means confined to these special classes of person. Although the Lübeck disaster caused an unfortunate and quite unmerited setback in Norway as elsewhere, B.C.G. vaccination of the general public has been undertaken on an increasing scale since 1935, and the policy in 1940 was to vaccinate the whole tuberculin-negative population, including school children. That the German authorities now in control have stopped this programme will only serve, as Dr. Dedichen said, to increase its popularity when their occupation ceases.

No other country has such a record as this to show, nor are figures from elsewhere so significant, though without exception they show the same trend. In Saskatchewan the programme of tuberculosis control described by Lieut.-Col. Bennett relies rather on segregation of infective cases, universal diagnostic facilities, and public education, but two interesting attempts with B.C.G. are in progress. Tuberculosis is still ten times commoner among North American Indians than in the European population; Indian babies are therefore being immunized, controls being provided by the simple method of inoculating only those born in alternate years. Immunization is also afforded to all tuberculin-negative nurses, among whom, as in Norway, the disease has in the past been unduly frequent. The results of these efforts, so far as they can yet be assessed, are satisfactory. These accounts of sustained and well-organized study, together with that given by Muckenfuss of experience in New York City, have no counterpart in anything which this country can produce. B.C.G. has recently been used here on a large scale, Col. Holst having immunized nearly 4,000 men in the Norwegian Army, but he had to obtain the material by air from Sweden. Lyle Cummins mentioned having obtained it from France, and treated only 12 patients when he was stopped by the Ministry of Health on the ground that "the vaccine was not standardized." It was more encouraging to hear from Dalling that the field experiments of the Ministry of Agriculture are now in progress on a large scale. The method has been to immunize calves, place them in heavily infected herds, and examine them post mortem only after natural death or at the end of their term of usefulness. Of 50 original animals, 20 have been killed so far, and of these only 3 had tuberculous lesions, some being trivial: the present experiment embraces some thousands of cattle, but its results will not be known for 5 years or more. No calves have been immunized with a vole bacillus vaccine; a further series so treated should certainly be started. It was interesting to hear from Wells himself that he had administered living vole bacillus vaccine to 3 human volunteers; they became tuberculin-positive in consequence, and the only ill effect was a local abscess in one given a larger and possibly excessive dose.

1 *Brit. J. exp. Path.*, 1940, **21**, 104.
2 *J. Hyg., Camb.*, 1940, **40**, 673.

A strong feeling was expressed at the meeting on Nov. 19 that official inertia in this matter has lasted long enough, and, indeed, resolutions were passed the effect of which will be a request to the Ministry of Health that prophylactic immunization against tuberculosis should be at least countenanced if not encouraged. An official policy there certainly should be, and not merely a reluctance to embark on a difficult project until perhaps some of its difficulties have been removed by the greater enterprise displayed in other countries. It may be added that our other facilities for combating the disease do not compare so well with those in some other parts of the world that we can easily afford to disregard this one: an audible gasp at this meeting greeted the statement that in Saskatchewan there has been no sanatorium waiting-list for the past 15 years. If we are to await the full results of cattle tests, nothing will be done until 1950. To those familiar with Norwegian work in particular, it may well seem that the experimental period even in man is already over, and that nothing remains but to apply the method at whatever age, on whatever scale, and in whatever classes of person the circumstances demand. The case for at least a cautious trial in certain classes of hospital nurse is hard to gainsay if we assume a special liability to tuberculosis in that occupation. It is necessary for us to assume this because our information about the frequency of tuberculosis in nurses comes from Norway,[3] Canada,[4] New Zealand,[5] and the U.S.A.[6] No doubt a similar inquiry in Great Britain would reveal a similar state of affairs, and the risks involved in admitting sputum-positive cases of pulmonary tuberculosis, diagnosed or not, to general hospital wards are now more widely recognized. But such an investigation has yet to be made, and this is another matter in which an effort to overtake our hitherto more enterprising colleagues abroad might well be made in the near future.

OUTBREAK OF INFLUENZA

Influenza has not appeared in epidemic form in this country since 1937. It is natural to ask if there are any omens by which we could predict a widespread outbreak in this fifth winter of the war, but unfortunately the phenomena which determine epidemic influenza are still largely unknown. If, then, we must avoid drawing conclusions from certain known data, we should at the same time be prepared to take any measures calculated to limit the spread of influenza if it comes, and to lessen the risk of secondary complications which contribute so largely to both morbidity and mortality in outbreaks of the disease. Such omens as exist are not particularly favourable. Of the two known types of influenza virus, virus A, which is more associated than B with epidemic outbreaks, has been little in evidence since 1940–1, when, instead of producing the expected epidemic, it occurred in mild sporadic infections as a virus of rather low virulence.[7] Specific resistance to it is therefore likely to be at a low ebb in the population at present, and clinical infection is most likely to occur in those with little or no antibody. We understand that virus A has been isolated from outbreaks in different parts of the country, and signs of its effects now appear in the weekly returns of the Registrar-General; we therefore find it difficult to understand the statement by the Ministry of Health that "the illness from which most of the victims are suffering is not the real 'flu virus." Even if it does not exact a heavy toll of life, a widespread attack may cause a great loss of working-days at a time when a maximum effort is needed for an early termination of the war.

Influenza is mostly spread directly from one person to another by droplets. In spite of the posters and slogans, many people are still unmindful of the fact that covering the cough and the sneeze is good hygiene as well as good manners. Infected persons, both for their own sake and their neighbours', should go to bed or stay indoors from the onset of symptoms; those in key positions particularly should try to avoid unnecessary exposure, as in picture-house or "pub" or other crowded places of assembly. The influenza virus has a greater viability in dry than in humid atmospheres,[8] so that infection may occur in centrally heated, poorly ventilated offices and the like without the intimate contact necessary for direct droplet spread. It is not possible to say whether this kind of air-borne infection can be prevented by aerial disinfectants, for while ultra-violet light and the bactericidal "aerosols" of sodium hypochlorite or propylene glycol are very efficient in the experimental chamber, they lose the greater part of their effectiveness in the presence of dust particles. Dissemination of dust may be minimized by oiling floors in canteens and workshops, and this measure has apparently given good results in an Army experiment where after the floors of barracks, offices, etc., in one unit had been oiled throughout the winter months the average weekly incidence of respiratory infections was 7 per 1,000, compared with a rate of 38 per 1,000 in a control unit.[9]

Upper respiratory virus infections such as the common cold, influenza, and measles are frequently followed by secondary bacterial complications—otitis and sinusitis, bronchitis and pneumonia—due to the haemolytic streptococcus, staphylococcus, or pneumococcus. These organisms may already be present in the nose or throat of the patient; more often they come from an outside source, and a remarkable feature of post-influenzal pneumonias is the preponderance of one type of organism in a particular outbreak. Thus, if chemotherapy is useless against the primary virus infection,[10] the more active sulphonamides—e.g., sulphathiazole or sulphamezathine—may prove useful in preventing or controlling secondary complications. The administration of these drugs is particularly advised where there is a history of secondary bronchitis or sinusitis after a primary virus infection. Needless to say, the patient should be confined to bed during treatment, and in view of post-influenzal debility and depression should not be allowed to return to work too early. The risk of secondary infection is greatest where many patients have to be nursed together. If prophylactic sulphonamides fail in these conditions, oiling of floors and of bed linen to control dust-borne infection may prove useful. With Service cases,

[3] Heimbeck, J., *Arch. intern. Med.*, 1928, **41**, 336; 1931, **47**, 901.
[4] Ross, E. L., *Canad. med. Ass. J.*, 1930, **22**, 347.
[5] Carmalt-Jones, D. W., *Tubercle*, 1933, **15**, 59.
[6] Israel, H. L., *et al.*, *J. Amer. med. Ass.*, 1941, **117**, 839.
[7] Andrewes, C. H., Glover, R. E., Hudson, N. P., Lush, Dora, and Stuart-Harris, C. H., *Lancet*, 1941 **2**, 387.
[8] Edward, D. G. ff., Elford, W. J., and Laidlaw, P. P., *J. Hyg.*, Camb., 1943, **43**, 1.
[9] *Army Med. Dept. Bull.*, No. 28, Oct., 1943.
[10] Andrewes, C. H., King, H., and Van den Ende, M., *J. Path. Bact.*, 1943, **55**, 173.

isolation and nursing in billets or small units is preferable to congregation in large hospital wards. And it must never be forgotten that adequate bed-spacing and good ventilation are the great enemies of respiratory infection.

CONTROL OF NARCOTICS

The annual report for 1942 by Sir T. W. Russell Pasha[1] on the work of the Egyptian Narcotics Bureau is as thorough and informative as usual, besides containing some new and important features. Thus the menace of imports from Japan and Japanese-occupied China of morphine, heroin, and cocaine has been eliminated under war conditions. On the other hand, Indian hemp is largely cultivated in Syria and Lebanon and is clandestinely transported into Egypt; while large quantities of Turkish opium are still being smuggled through Syria to Egypt. A new drug abuse has come to light in the smoking of the dried leaves of cannabis and hyoscyamus, either separately or combined, and fresh legislation to check this growing evil is being invoked. Drastic steps, which were well supported by General Catroux, have been taken to arrest the cultivation of cannabis (hashish) in Syria. According to report by the Commander-in-Chief of Free French Forces on July 23, 1942, an area of 150 hectares in the Levant States was producing 75 tons of dry raw hashish; of these, 90 hectares (i.e., 45 tons) had already been destroyed. This active anti-hashish campaign synchronized with the transfer to the Free French from the Vichy France control, which is said to have been "completely hashish-minded." Russell Pasha concludes his report with the wise reflection: "It is sad to see the people searching for a stimulant, not so much with the object of being vicious or criminal but in the hope of escaping, if only for an hour or two, from their lives of penury and toil." He looks upon drug addiction as "part of a large vicious circle in which the drug desire is an effect and not a cause," and holds that with proper feeding and raised health standard the Central Narcotics Bureau might even close down; until that desideratum is achieved, however, he urged no relaxation of the efforts on the part of the staff over which he has so efficiently presided.

PSYCHOPATHIC PERSONALITY AND THE ELECTRO-ENCEPHALOGRAM

The study of electro-encephalography has advanced far during the past two or three years, and, combined with surgery, neurology, psychology, and even criminology, has opened up and widened many new paths of interest, notably in the study of psychopathy. In America Silverman[2] has published the results of a study of 75 psychopathic criminals. Of these "80% had psychologically unhealthy factors in childhood," and "nearly all were born with or acquired in infancy a defective cerebrum, a physico-chemical abnormality (as far as can be determined) which affects chiefly the frontal, or 'silent,' areas of the brain." Electro-encephalographic studies revealed 80% abnormal or border-line tracings; and one characteristic feature of these records was a 6 c/s rhythm from the frontal and prefrontal areas in the majority of cases. There were also other types of abnormalities—for example, "spike and wave" rhythm, denoting the patient to be an epileptic as well as a psychopath. These findings would suggest that, for some reason as yet undiscovered, the psychopath frequently has some kind of disturbance of the frontal regions of the brain. This is of particular interest because the success of the leucotomy operation, first performed in Portugal by Moniz, supports the hypothesis. This operation has been done on several hundreds of patients both in America and in England, with, on the whole, gratifying success. It consists in bisecting the frontal lobes with a blunt instrument, producing damage to the brain in the nature of a permanent lesion, with the result that the behaviour of this type of patient often improves dramatically.

Electro-encephalography is now being performed more and more on criminal cases and is becoming almost a routine procedure. Public interest has been aroused by the accounts in the lay press of electrical tests in persons charged with murder, but these descriptions are often inaccurate and misleading. A potential criminal might think it possible to alter his "brain waves" by hypnosis and so escape sentence. Lundholm and Löwenbach,[3] however, have recently made a study of hypnosis and the alpha activity of the electro-encephalogram, and "the results of this study indicate that cortical electro-activity is not affected by modification of seeing or hearing through hypnosis." From the electro-encephalographic standpoint, therefore, it would seem that a frontal abnormality would be expected in psychopathic personalities. As a contrast to this, stutterers form an interesting group, exhibiting subtle abnormalities in the occipital portion of the brain, according to Douglass[4] and Knott and Tjossem.[5] Douglass made a study of records taken from 20 stutterers and 20 non-stutterers during conditions of speech and silence, and the records were examined for evidence of bilateral and unilateral blocking of the alpha rhythm. "Intergroup comparisons showed that the stutterers and normals could not be differentiated on the basis of the mean per cent. time unilateral blocking of the alpha rhythm either in speech or silence, but there was a greater bilateral blocking of the alpha rhythm in the occipital areas in stutterers during speech than in the non-stutterers during speech. Stutterers tended to show more blocking in the left occipital area during silence, and non-stutterers a greater amount of blocking in the right." Knott and Tjossem made a survey of two groups of stutterers to confirm Douglass's theory. They also showed an asymmetry of the alpha rhythm in the two occipital regions, as did Douglass, but no such difference appeared in the motor area. Both groups in this study were small, and, although there was good correlation between the two findings, more data need to be collected and surveyed, and the study of this problem should be encouraged. Psychology is essentially a study of the mind and its aberrations. Electro-encephalography shows that even slight mental disorders may be secondary to latent organic disturbance of the brain.

MALARIA CONTROL IN FREETOWN HARBOUR

Freetown, owing to its geographical position and capacious harbour, has played an important part in respect to shipping both in the present and in the last world war. Unfortunately malaria has presented a serious problem. The health of the town, at one time notoriously evil, has been much improved as a result of measures against malaria carried out for many years by the municipal authorities. But emergency conditions of to-day have forced ships to anchor at places in the harbour that under normal conditions would have been avoided, with the result that fresh sources of malarial infection have become a serious menace to shipping. How this malaria was being contracted and what should be done to prevent it have been under investigation by a commission composed of Dr. D. B. Blacklock, Professor of Tropical Medicine at

[1] Annual Report for 1942 of the Central Narcotic Intelligence Bureau, Cairo Government Press, Bulac, 1942.
[2] *Arch. Neurol. Psychiat.*, Chicago, 1943, **50**, 18.
[3] *Charact. Pers.*, 1942, **11**, 145.
[4] *J. exp. Psychol.*, 1943, **32**, 247.
[5] Ibid., p. 357.

Liverpool University, and Dr. Carmichael Wilson of the Colonial Medical Service, acting on instructions from the Secretary of State for the Colonies. Recommendations by the commission, which has spent a year in the area, are now being systematically carried out and a great deal of permanent drainage and other measures of mosquito control undertaken in conjunction with the Service authorities. An important development in antimalaria work in this region has been the knowledge gained regarding the part played in transmission by the dark variety of *Anopheles gambiae* known as var. *melas*. This variety breeds in the mangrove swamps, but as a result of the work of Dr. Muirhead Thomson, who has been investigating its habits, it is now known that it does so only in connexion with one particular form of mangrove, which grows in limited clumps or orchards and can be eliminated. In addition to measures against the breeding places various precautions are also in use to minimize the transport of adult anopheles to ships by lighters and other shore craft, combined with mosquito proofing and the spraying of the ships themselves. Meanwhile the Ministry of War Transport has been doing everything possible to bring the knowledge of malaria risks to those travelling in ships, through the agency of ships' masters and by propaganda leaflets and in other ways. Cases are often not developed during the ship's stay in harbour but later on in the voyage, and in order to be kept informed of such cases arrangements have been made for reports on all ships' personnel arriving in the United Kingdom from West Coast ports to be forwarded to the authorities at Freetown. A serious difficulty is that ships often spend a night or two at intermediate ports up river in various territories where it is not practicable to control mosquitoes to any extent. It is the intention of the various Governments concerned that measures for the control of malaria at the various West African ports and stopping places shall continue after the war until the conditions in relation to danger from malaria have been placed on a thoroughly satisfactory basis.

THE POLICE DECOY AND THE DOCTOR

Some three weeks ago a registered medical practitioner, Dr. Theodor Goldschmidt, a refugee from Nazi Germany who qualified in this country in 1935, was consulted by three men complaining of symptoms of ill-health. Dr. Goldschmidt took their medical histories in good faith, accepted as true what was told to him, and issued medical certificates stating that the men were unfit for work. He was subsequently arrested, and proceedings were brought against him under the Defence Regulations. The charges against Dr. Goldschmidt were dismissed, and costs of 10 guineas were awarded by the magistrate against the prosecution.

This sounds a commonplace enough tale. But there is, as many readers probably know by now, much more in this case than a charge of false certification from which the practitioner is finally cleared. The patients were bogus; the medical histories they gave were bogus; the men were, as was admitted in the magistrate's court by Detective-Sergeant Barker of New Scotland Yard, *agents provocateurs*. As Mr. Reginald Payne says in a letter published elsewhere in this issue, which we hope everyone will read, they were just "copper's narks"—that is, police decoys. This case was defended by the Medical Defence Union. We understand that the Union, feeling that the time had come to expose such attempts to trick doctors, arranged for leading counsel to be briefed on behalf of Dr. Goldschmidt.

We do not know whether Scotland Yard and the police forces of this country are coping with their urgent problems under such difficult conditions as confront the medical practitioner. At this moment the doctors of this country are overworked, and one of the least pleasant parts of their daily task is the issue of certificates. What, then, are we to think of responsible police officials when they stoop to such measures, waste their own time and, what would appear to be much more valuable, the time of a man practising his profession among sick people? One is constrained to ask, What type of mind was it that conceived this piece of police trickery? What was the motive behind it? To what extent from now on must a doctor in practice suspect any new patient of being a police agent out to smirch his professional character by deliberately telling lies about the state of his health? We hope that medical men all over the country will be vigilant to preserve the real liberties of the doctor, and oppose vigorously all such pernicious attempts to disrupt the doctor–patient relationship, which must be based on the fullest confidence and trust between the two.

MEDICAL SPECIALISTS FOR MALTA

That the trustees of the Nuffield Foundation (the formation of which was announced in these columns on Feb. 20 last, p. 225) had undertaken a very big task no one doubted, nor was it expected that anything like a complete programme for future activities would be settled for some time to come, probably not until after the war. The trustees, however, have not waited to finish their plans before making an initial grant which will give much satisfaction at this time—namely, a substantial contribution towards developing the specialist medical services of Malta. Six Maltese doctors, chosen by the Government of the island, are to receive grants for postgraduate training in Britain for the following appointments in the public service of Malta: orthopaedic surgeon or assistant orthopaedic surgeon, radiologist, tuberculosis officer, two infant welfare officers, and prison medical officer. The grants, which will be £400 a year for unmarried men or women and £600 for married persons, will be tenable for a period not exceeding two years; there will also be an allowance for travelling expenses. The training will be given at institutions to be decided upon by the trustees in consultation with the Colonial Office. The recipients will have to give the Government of Malta an undertaking to return to the island at the end of their training to take up the public appointment for which they were chosen. This action of the Nuffield Foundation will be warmly welcomed by the profession throughout the Empire.

MEDICAL RESEARCH COUNCIL

The Committee of Privy Council for Medical Research has allowed amendments to the Charter of the Medical Research Council, simplifying the rules governing the retirement of members of the latter body and increasing the number of members by one. By further Orders of the Committee of Privy Council, made after consultation with the President of the Royal Society and with the Medical Research Council, Prof. L. J. Witts, M.D., F.R.C.P. (Nuffield Professor of Clinical Medicine in the University of Oxford), and Prof. J. R. Learmonth, Ch.M., F R.C.S.Ed. (Surgeon to H.M. Medical Household in Scotland and Professor of Surgery in the University of Edinburgh) have been appointed to be members of the Medical Research Council.

Readers will find in our *Supplement* this week a letter on provident schemes in future medical services signed by the chairman of the Executive Council of the British Provident Association.

LONG-PERIOD RECURRENCES IN CANCER

BY

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Almost all recurrences of cancer appear at intervals of a few months or years, and recent studies have shown that when the onsets of active phases of growth can be dated to a few weeks they may be timed at intervals which are multiples of 7.6 months (33 weeks ± 3 weeks) or of the half-period (Webster, 1940).

Late recurrences of cancer are so comparatively rare that few observations of value from a statistical basis can be reported by any one centre; and many of the data (as in Ahlbom, 1935, in salivary-gland tumours) must necessarily be from patients' records of treatment elsewhere, or from the patients' memories of past events. But recently some observations have suggested confirmation of my previous records that the onsets of late recurrences are more often grouped together at intervals of 7 or 11 years, or of their multiples or sums (as 14, 18, 21, 22, and upwards), than at the intervening years. The subject was raised lately by the Astronomer-Royal (Sir Spencer Jones) in correspondence; for it would be unlikely that the minor 7.6-months solar cycle should appear to have biological significance (or the rotation one of 27 to 28 days) and the major solar cycle, averaging 11.2 years (17½ periods), be inoperative.

A preliminary notice of studies in progress may be of interest, as any new aspect of cancer may be of importance in time (as in helping forward any prophylactic measures against recurrence: Webster, 1942a).

Analysis of Recurrences

Out of over 3,000 recurrences analysed in neoplastic disease 284 were detailed in their time-relations (Webster, 1940), and of these 248 were in the first three years, 35 in the fourth to twelfth years, and 1 at 28 years. The tenth and eleventh years showed a small peak of six cases, as compared with only one or two at neighbouring years. Notes of some cases seen recently, other case records, and a brief study of the literature confirm this finding: there seems to be a greater probability of the onset of late recurrences of cancer at 7 and 11 years, or at their multiples, than at other intervals of years.

7 Years.—(11 periods.) Seven cancer cases seen lately (lip, breast (2), rectal, glioma of eye, thyroid, and rodent ulcer); one multiple case—tongue and pyriform fossa—had a 7-year interval between onsets.

11 Years.—(Approximately 16 to 18 periods of 10.2 to 11.5 years.) Nine cases (6 recorded in Webster, 1940) of recurrence or second primary have been seen. Sarasin (1939) recorded 5 approximately 11-year recurrences in cancers of the mouth in a study of recurrent cancer at this site. A Hodgkin patient, with a 23-years history, now well, had an 11-year remission once.

14 Years.—One breast case seen lately has a 14-year recurrence after apparent cure following buried radium and *x* rays (operation had been refused). 14-year and 18-year recurrences of activity have been detailed by Ahlbom (1935) in salivary-gland tumours: in several the total history from onset to death was 18 years. He gave a number of 7-, 10-, and 11-year cases, as well as one recurring each at 21, about 30, and about 50 years.

22 Years.—In one week lately two patients reported to the Middlesex Radiotherapy Institute with second primaries 22 years after the onset of rodent ulcers, cured with radium applications. Ahlbom had one case.

29, 30, and 32 Years.—Ahlbom had several cases.

50 Years.—Ahlbom (1935, p. 200). Case 187, malignant parotid tumour, growing for about 50 years—"much more rapidly in the past few months." Ahlbom (p. 63): Case 4, benign mixed parotid tumour, recurring about 52 years after the first onset at 14 years of age. Prof. W. D. Newcomb at a recent discussion at Oxford referred to a 50-year recurrence of a parotid growth.

Discussion

The occasional cases found with activity beginning again at intervening years are usually at multiples of the fundamental 7.6-months cycle (or its half-period). The link between this and other solar and planetary cycles and the biological (in tree-rings and diseases, for example) is probably a meteorological one. Most detailed studies of weather cycles have been concerned with the very short oscillations up to a month or so, with monthly or yearly means, or with long cycles of years. But charts of years of temperature, pressure, rainfall, etc. (with daily to monthly details), show as a rule signs of the 3.8-months and 7.6-months cycles; and almost all the longer cycles found—as by Beveridge (1922) in wheat prices and weather, and by Brunt (1927) in European temperature, pressure, and rainfall records for 100 years—are multiples of the 7.6-months cycle or the half-period (of 15 to 18 weeks). Brunt (1919) traced in Greenwich temperatures the period (228 days), and six multiples of it up to 9.5 years (by periodogram analysis). A number of the long weather and disease charts of Petersen (1934) show periods and half-periods in both weather fluctuations and disease; and he has charted (Petersen, 1938) how the 11-year solar cycle has a direct correlation with the death rates in some infective disease records, as in tuberculosis, epidemic meningitis, and puerperal sepsis. Tuberculosis, it may be noted, has been found lately (Webster, 1943) to show a similar cycle, in its relapses, to the influenza–cancer cycle of recurrences. Petersen has reported in great detail clinical and biochemical studies of the microcycles of fluctuations in normal and ill persons parallel to weather oscillations. In both, the curves are those similar to "relaxation oscillations" as studied in physiology (A. V. Hill, van der Pol), and they are not simple sine waves, following one another at invariable periods of time, as electrical pulses in a wire. Special statistical methods will probably have to be devised for the study of such cycles, as is suggested by E. B. Wilson (1936). Biochemical and blood research into the cycles of activity in cancer patients is urgently called for, on lines initiated by Petersen and by Gruner (1941, 1942) in their preliminary studies.

Summary

Analysis of some late recurrences of cancer shows a preponderance in the years 7 and 11 and their multiples. If this be confirmed by later studies it would be a further correlation between solar and biological cycles of disease already suggested by the apparent correlation between the short-period recurrences of cancer—and some metabolic, nervous and mental, and infective diseases (Webster, 1942b, 1943)—and the 7.6-months (33 weeks) cycle discovered by R. Wolf of Zurich in 1859. It was 100 years ago that Schwabe discovered the 11-year solar cycle. It is suggested that meteorological factors are the connecting-link between solar phenomena and disease cycles. Follow-up departments, not ceasing to keep in touch with neoplastic cases after ten years or longer, may, as measures of preventing recurrences become available, find this periodic aspect of value in helping to detect recurrences as early as possible.

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Last May Lord Nuffield announced a scheme for the provision of specialist and nursing-home treatment supplementary to anything obtainable under the proposals of the Beveridge report, to be known as the Central Provident Association (*Journal*, June 5, p. 705). To meet the special needs of Scotland the Scottish Nuffield Provident Society has now been formed, and will act as the Scottish branch of the central body. The terms of membership are the same as in England—namely, anyone under the age of 60, without income limit, living or working in any part of Scotland may join. The annual contribution for a member without dependants is £2 15s.; there is no limit to the number of dependants included in a "family membership"; an adult dependant's contribution is £1 15s. a year, and 10s. is payable for each child under 18. Benefits are also the same: £6 a week for hospital or nursing-home treatment of a member, substantial grants for consultant and other specialist services, and up to £70 for any one operation or illness; and a family may claim benefit up to £105 in any one year. The society's offices are at 10, Duke Street, Edinburgh, 1, and local offices are shortly to be opened in Glasgow and the principal Scottish centres.

SURVIVAL RATES IN PULMONARY TUBERCULOSIS

BY

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In a previous communication (Thompson, 1942) was described an investigation of 406 adult patients with sputum-positive tuberculosis, being the entire population of a compact industrial area so diagnosed in the years 1928-38. Observation has now been carried forward two more years, and of the few cases previously lost sight of some have been traced, so that the incidence of survival is now as follows:

TABLE I.—*Number of Patients known to be Alive on Each Anniversary*

Year of Diagnosis	0	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th
1928	38	20	17	15	10	8	6	6	6	6	3	3	3	3	3	3
1929	40	22	10	7	7	7	5	5	5	4	3	3	2	2	2	
1930	46	24	17	15	14	10	9	9	9	8	6	6	6	6		
1931	35	26	16	15	12	12	12	12	9	9	5	5	5			
1932	41	21	16	14	10	10	9	7	6	5	4	4				
1933	36	22	18	15	11	9	5	5	5	4	4					
1934	36	21	12	11	10	6	6	6	6	4						
1935	44	30	21	19	16	13	9	5	5							
1936	36	19	14	10	8	8	5	5								
1937	37	25	20	15	14	12	9									
1938	17	12	11	10	9	8										
Total alive at end of each year (l)	406	242	172	146	121	103	75	60	51	40	25	21	16	11	5	3
Lost sight of in following year	—	3	1	1	2	5	—	—	2	5	—	1	—	—	—	—
Total under observation during each year (n)	—	406	239	171	145	119	90	66	55	44	31	21	16	11	5	3
Probability of surviving each year (l/n)	—	0·60	0·72	0·85	0·83	0·88	0·83	0·91	0·93	0·91	0·81	1·00	1·00	1·00	1·00	1·00

By taking from Table I the proportion of patients (p_x) who survive each individual year (x) from the date of diagnosis, it is convenient to set out in life-table form (Table II) the results of these calculations when applied to a standard of 1,000 patients.

TABLE II

1 Year following Diagnosis (x)	2 Probability of Surviving Each Year (p_x)	3 Probability of Dying Each Year (q_x)	4 Number Alive on Each Anniversary out of 1,000 Patients (l_x)	5 Number Dying Each Year (d_x)	6 Probability of Surviving a Further 5 Years ($5p_x$)
0	0·60	0.40	1,000	400	0·27
1	0·72	0·28	600	168	0·37
2	0·85	0·15	432	65	0·46
3	0·83	0·17	367	62	0·51
4	0·88	0·12	305	37	0·56
5	0·83	0·17	268	45	0·52
6	0·91	0·09	223	20	0·62
7	0·93	0·07	203	14	0·68
8	0·91	0·09	189	17	0·73
9	0·81	0·19	172	33	0·81
10	1·00	0·00	139	0	1·00

In column 4 is shown the number of patients of the original hypothetical 1,000 who remain alive (l_x) on any stated anniversary of the date of diagnosis, and column 6 gives the expectation of living a further 5 years ($5p_x$) for any patient entering upon that particular year. This expectation on the day of diagnosis is approximately a 1 in 4 chance, improving to 50/50 if the first 3 years are survived.

These results were fully discussed in my earlier paper, in which attention was drawn to the poor outlook for cavitary pulmonary tuberculosis when considered collectively, without regard to treatability and other individual factors. One point seems to be further endorsed: though no patients died after surviving 10 years, nearly half of those who were alive after the first 5 years failed to survive the second 5 years. Thus the method often employed for estimating results of treatment, by comparing numbers of patients who are living at the end of 5 years, should allow for the possibility that disease in such survivors is not necessarily cured or even quiescent, since subsequently it may as likely as not prove fatal. On the present findings a 10-year survival should be fairly reliable. Though even in the 9th year almost one-fifth of those who were alive when it opened failed to see the year completed, the few survivors reached the 15th year without further loss.

An additional analysis was made to determine the prognostic effect of sex and age. It was found that the probability of surviving 5 years for the 211 males was 0.26 and for the 195 females 0.25, figures not significantly different. An analysis by age is given in Table III.

TABLE III

Age in Years:	10–19	20–29	30–39	40+
Number of patients	87	148	95	76
Probability of surviving 5 years	0·20	0·26	0·33	0·21

The best outlook is thus for those in middle life; the young and the elderly fare notably worse. Speculations aroused by this phenomenon cannot be discussed in this brief communication, but tuberculosis workers will no doubt find that it confirms a fairly general clinical impression.

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ALTERATIONS IN THE "B.P."

The General Medical Council announces certain alterations in the *British Pharmacopoeia*, 1932. A new monograph gives specifications for liquid extract of colchicum corm, which now contains 0.3% w/v of colchicine (limits, 0.27 to 0.33). *Preparation:* Tinctura colchici. Doses—*Metric* 0.12 to 0.3 mil. *Imperial* 2 to 5 minims. Liquid extract of colchicum corm contains in 0.3 mil. 0.0009 gramme, and in 5 minims about 1/70 grain, of colchinine.

When liquid extract of colchicum is asked for, liquid extract of colchicum corm may be supplied, and the latter may be used in making tinctura colchici. Aromatic solution of ammonia may be used in place of aromatic spirit of ammonia, and a mixture of one part of concentrated compound tincture of cardamom and three volumes of water may be used in place of compound tincture of cardamom in making mistura sennae composita. A mixture of one volume of concentrated tincture of tolu and three volumes of water may be used in place of tincture of tolu in making lozenges. The tincture of orange may be omitted from confectio sulphuris.

The Industrial Welfare Society (14, Hobart Place, Westminster, S.W.1) held its annual general meeting on Nov. 19, when a message of loyal greetings to the King (its patron) was dispatched, and a reply from His Majesty said: "I am delighted to see the long years of steady work repaid by the increase in welfare work and personnel management in industry. I hope for continued extension in the post-war period and I wish the members every success in their efforts." The annual report, with balance sheet, was of the briefest character in order to comply with the Paper Controller's request for economy. It recorded that the membership had reached its highest peak, no fewer than 520 members having joined since July 1, 1942. A feature of the year's work was the close and friendly association established with practically every Government Department. A considerable number of meetings of every kind and in many districts were addressed by the director (the Rev. Robert R. Hyde) and members of the staff. Mr. T. E. A. Stowell, F.R.C.S., continues as chairman of the advisory medical committee.

Reports of Societies

B.C.G. IMMUNITY IN TUBERCULOSIS

NORWEGIAN AND NORTH AMERICAN EXPERIENCE

A meeting of the Tuberculosis Association was held on Nov. 19, Dr. J. E. H. ROBERTS presiding, when two speakers from Norway and two from the other side of the Atlantic gave interesting accounts of the use of B.C.G. vaccination and tuberculosis control measures generally.

Dr. O. GALTUNG-HANSEN of the Norwegian Public Health Service was unable to be present and his short paper was read in his absence. He said that B.C.G. vaccination so far as the general population of Norway was concerned received a setback some years ago when the innocuousness of the vaccine was called in question owing to the deaths of a number of vaccinated children, the vaccine having been contaminated or confused with some more virulent strain. But this had been overcome and considerable progress had been made in recent years. The first systematic observations were among nurses, a class specially susceptible to tuberculous infection. As a result of vaccination the tuberculosis morbidity among this group could be said to have fallen to about one-seventh. The mortality in the vaccinated group was only 0.2%, while in the group which had refused vaccination it was 1.8%. In 1937 groups of medical students began to be submitted to vaccination, and similar results had been obtained.

Some observations had been made at the tuberculosis clinic at Oslo to determine the lasting nature of the allergy. It was found that the allergy acquired with vaccination lasted four years or more in most cases. Within one year of successful vaccination 0.6% of the group of patients had become tuberculin-negative, 2.4% within two years, 5.4% within three years, and 3.3% within four years. During the years 1930–5 considerable progress was made in the use of vaccination, and it was extended from its application chiefly to nurses and medical students to people living in houses where there was tuberculous infection. Up to 1936 fewer than 100 vaccinations per year had been performed at the municipal tuberculosis clinic at Oslo, but in later years this figure had risen to more than 1,000. At present vaccination was offered to tuberculin-negative workers in factories where cases of tuberculosis had occurred and also to school children whose parents desired it. Allergy seemed to be gained more quickly after subcutaneous inoculations than after intradermal ones. During the war the use of B.C.G. had become more extensive, partly owing to improved methods of using it and partly owing to fear of the spread of tuberculosis. In Sweden the vaccination of children exposed to tuberculous infection had been employed since 1927, but had increased during recent years, and in Denmark more than 6,000 people were vaccinated in 1942. The fact that in certain cases the Nazis had stopped the vaccination and confiscated the apparatus naturally increased the popularity of the method!

Vaccination in Norwegian Army

Prof. HOLST of Oslo said that B.C.G. was introduced among the Norwegian Forces in this country, and up to the present between 3,500 and 4,000 men had been inoculated. The experiment was too recent for any conclusion to be drawn, but a point which was of interest was that there had not been a single case in which the vaccinated person had come to any harm. The only noticeable thing was the development in some cases of small subcutaneous abscesses. It was desirable, of course, that a person should be vaccinated two or three months before he came into the surroundings in which he was exposed to increased risk, but this measure had not been possible. The men had to be vaccinated after they had entered the Service. Another difficulty was that of obtaining B.C.G. vaccine in this country; it had to come by air from Sweden in small quantities, and, of course, the vaccine ought to be employed very soon after its issue from the laboratory.

In the first year after the arrival of the Norwegian Army in this country the incidence of tuberculosis was rather high. Since then the number of fresh cases had declined steadily, but he was not prepared to say that the recent vaccination had had anything to do with this.

On the general question there were two groups in the community to which quite separate considerations applied—namely, children in tuberculous families, and young people between the ages of 15 and 20. The latter were in his view the more important class, and it was specially important to immunize, so far as possible, young persons leaving their homes and going into universities, hospital work, factories, or seafaring. It was an excellent thing to have these young people vaccinated two or three months before they went into such surroundings. It was also necessary to emphasize that such vaccination should be carried out in association with other prophylactic measures.

Immunity Measures in Canada

Lieut.-Col. C. F. BENNETT (Canadian Army) gave a lecture in which he extended the subject to cover all tuberculosis control measures in Canada. He dealt particularly with his own province of Saskatchewan. The province, he said, had a population of 900,000 and a density of 3 or 4 per square mile. About one-half were of British stock. The methods used were first of all segregation, anything short of which was a snare and a delusion. In his province they had been able to accommodate in sanatoria all the cases that could be found and to treat them for as long as was necessary. The average period of treatment for all types of tuberculosis, pulmonary and non-pulmonary, both child and adult, was 12 to 13 months. The treatment was free to the individual. The cost had been borne since 1929 by a special tax.

In the next line of control came educational measures. Teaching was given, especially to members of the teaching profession, seven or eight hundred of whom went out to the schools every year. These student teachers were first of all tuberculin-tested, they were examined (including an *x*-ray examination), and their family and personal history was elicited. Talks were then given to them about tuberculosis, and it was hoped that in their various teaching spheres they would act as missionaries. Further measures in Saskatchewan included the provision of adequate diagnostic facilities, sufficient to cover the entire area, and contact was made with general practitioners in all parts of the province. Yet another measure was the elimination of bovine tuberculosis, a disease for which there was very little excuse. It could be readily diagnosed and stamped out.

In 1921 in Saskatchewan there were 420 deaths from tuberculosis; in 1941 this number had declined to 161, but in the meantime the population had increased by 130,000, so that the tuberculosis death rate, which in 1921 was 56.4, had fallen to 17.5 in 1941. The tuberculosis death rate for Canada as a whole (in 1940) was 51. A recent addition to the facilities in Saskatchewan was miniature mass radiography. There was increasing difficulty in case-finding. Each year more cases were examined and fewer cases found, yet it was known that there was a certain residuum of infectious cases at large. Their concern now was to find the chronic cases, people not ill enough to consult a doctor or to stay away from work. Mass radiography seemed to be the answer to this problem. Three units were in operation, and so far 110,000 people had been examined. The inclusive cost of each examination was between 8d. and 1s. Ordinary methods of case-finding would still be pursued, but these would be supplemented by a miniature radiography service capable of covering the entire province every five years.

B.C.G. Vaccination in Saskatchewan

Col. Bennett said that the experience of B.C.G. in Saskatchewan dated back to 1933, but the numbers were not large. The first groups taken were Indian babies (Indians in Saskatchewan numbered 15,000 and were very susceptible to tuberculosis). The procedure followed was to vaccinate all the Indian babies born during one year and to use the babies born in the following year as a control. The latest report, to Dec. 31, 1941, showed that among 330 controls there had been 4 deaths from tuberculous infection, 9 others required treatment, and 9 were under observation. In a parallel group of 390 vaccinated subjects there had been 1 death, 3 required treatment, and 7 were under observation.

A second group consisted of student nurses and recent graduates, among whom the breakdown rate had been ten times as high as among the student teachers of similar age. Routine tuberculin testing was instituted ten years ago, and 75 to 80% of these girls were found to be negative reactors. It became apparent that it was the negative reactors who were contributing so heavily to the breakdown rate. There seemed to be ample evidence that vaccination was safe, and therefore a measured dose of highly attenuated organisms was given. A preliminary report covering the three years up to the end of 1941 showed that 1,340 persons in this class had been vaccinated, and of these two student nurses and one sanatorium attendant developed tuberculosis. The latest report up to Sept., 1943, showed that in five years 1,800 had been vaccinated, and of this number 9 had developed tuberculosis. From a comparison with the number of breakdowns in the sanatorium service before the B.C.G. vaccination was instituted it seemed clear that the method brought about a reduction in the incidence of breakdown among unavoidably exposed negative reactors, reducing the incidence at least to the level of breakdowns among the general population. But it was unlikely that the resistance derived from vaccination would be adequate to protect the individual from continued exposure to infection, and reliance must still be placed chiefly on earlier diagnosis and earlier treatment.

Col. MUCKENFUSS (United States Army) described some slight experience in New York City, where vaccination had been carried out among certain children of tuberculous families. One set of figures showed 439 vaccinated, with 3 deaths from tuberculosis, a rate of 0.7%, compared with 16 deaths among 527 controls, a rate of 3%. But other sets of figures were less favourable to the method, and the speaker's conclusion was that on the whole B.C.G. was not a justifiable procedure in conditions as they existed among a limited section of the population in New York City. He also referred to the development of localized cold abscess, which had occurred much more frequently in the coloured than in the white population subjected to the procedure.

OPHTHALMIA NEONATORUM

The Section of Ophthalmology of the Royal Society of Medicine met on Nov. 12, with Mr. FRANK JULER presiding, to discuss ophthalmia neonatorum.

Prof. ARNOLD SORSBY said that since notification became compulsory in 1914 the rate for ophthalmia neonatorum per 1,000 births had fallen only from about 8.0 to about 6.6, though notifications from other infectious diseases had gone down surprisingly during the last thirty years. The large towns, apart from London, showed a distinctly higher incidence than the rural districts, although the opposite might have been expected in view of the better midwifery service in such areas. The figures for some towns were most erratic. Thus Leeds and Birmingham started from about the same level in 1918, but the rate for Birmingham in 1943 had gone up to 63.5, while that for Leeds had gone down to 4.2. It was incredible that such contrasts and fluctuations represented the real state of affairs. The incidence of ophthalmia neonatorum might more properly be assessed from the number of cases which occurred in hospital, taking gonococcal ophthalmia as a criterion. At 23 obstetric centres from which information could be systematized, out of 119,000 births there had been 98 cases of gonococcal ophthalmia. Taking the annual number of births as 600,000 and gonococcal ophthalmia as representing 25% of all cases, this would give a total of 1,920 cases of ophthalmia neonatorum in a year. There was reason to believe that an unspecified and indeterminable number of children suffering from impairment of vision or blindness were for some reason or other not returned in the official figures. Despite a great decline in the incidence of blindness due to this cause in the last two years, it remained a considerable problem, and the decline was paralleled or surpassed by the decline in blindness in all infectious diseases.

The decline in ophthalmia neonatorum must be ascribed not exclusively, perhaps not mainly, to silver nitrate, but certainly very largely to the improvement in ante-natal care. But local prophylaxis should not be ignored. The figures for Scotland, where the use of silver nitrate by midwives was compulsory, were distinctly lower than for England. In America attempts had been made to obtain a stable silver solution by means of a wax capsule, in which it kept very much better than in ordinary bottles. It was likely that present methods of prophylaxis, apart from ante-natal care, did not touch the residuum of ophthalmia, especially inclusion conjunctivitis, which was just as much a venereal condition as the other. Such cases responded extremely well to sulphanilamide. At the moment penicillin was being tried out in a series of ophthalmia neonatorum cases. Where penicillin was effective the results were more dramatic than with sulphanilamide, the conjunctiva being completely cleared within 36 hours, though he spoke with reserve because his experience of this agent was limited.

Dr. LETITIA FAIRFIELD said that London was the pioneer in collecting cases of ophthalmia neonatorum in a special hospital and giving them special treatment. This might account for the fact that the London figures were below those for other great cities. Notifications in London were about 9 per 1,000 births. In one year there were 19,222 births in the L.C.C. maternity hospitals, and among these there were seventeen cases of gonorrhoeal ophthalmia. But of the maternity cases in these hospitals 91% were "booked," which meant that the women had had the whole of their ante-natal care at a Council hospital, and 9% were emergency cases. Only nine of the ophthalmia cases occurred among this 91%; the other eight occurred among the 9%, some of whom had had no ante-natal care at all.

Value of Silver Nitrate

Prof. J. CHASSAR MOIR said that a good deal of the discrepancy in notification as between different centres was explained by the fact that one hospital had a tradition that all cases of "sticky eye" should be notified and another had not. Silver nitrate had stood the test of time, but he thought, nevertheless, that it was overrated. It certainly produced inflammatory reactions, and much of the eye trouble experienced was really due to irritation from the silver nitrate. He was strengthened in that belief by the fact that in one hospital for a time 2% silver nitrate was used, and the number of "sticky eyes" multiplied tenfold, going down again when they returned to 1%. Silver nitrate was used in other branches of medicine, but no urologist would use more than 1 in 500 solution in a bladder wash-out, and yet five times as much as that was put into the eye of a baby at birth. He protested against the teaching which seemed to hold in the medical schools that the proper treatment was to put in more and more silver nitrate. Recently he corrected examination papers for a higher diploma in obstetrics, and quite a number of candidates said that for ophthalmia neonatorum they would put in repeated instillations of 1% silver nitrate—one candidate actually said "every two hours." Mr. F. T. RIDLEY considered the treatment of "sticky eye" with silver nitrate was definitely bad. It was disastrous to use silver nitrate of 1% or more upon a cornea which was already ulcerated. He urged instead the use of argyrol as a safe prophylactic. Squad. Ldr. L. G. SCOULER also acclaimed argyrol as a stable preparation, and one which could be used with advantage.

Prof. SORSBY, in reply, said that it was fatal to rely upon any one measure for the elimination of ophthalmia neonatorum. As for the dangers of silver nitrate, some sense of proportion should be kept. After all, it was used extensively, it had been used in millions of births, and it could not be so dangerous as some people believed. Figures from lying-in hospitals would possibly show argyrol to be superior to silver nitrate, but the number of cases was too small to permit of a real judgment.

An industrial rehabilitation centre has been established at Wood Lee, Egham, Surrey, by the Ministry of Labour for men between the ages of 18 and 50 who, after a period in hospital or discharge from the Services on medical grounds, are not able immediately to take up employment. The centre will aim first at restoring confidence and mental and physical fitness through exercises and indoor and outdoor occupations, and secondly at testing the suitability of the man for a particular occupation or for training. The course, which will last six to eight weeks, is not suited to men still in the convalescent stage; it will be supervised by a medical officer, but no medical treatment or nursing will be available. Board and lodging and travelling expenses will be provided, and there will be weekly allowances for each man varying from 9s. to 24s., with further sums for a wife and children and the upkeep of a home.

Correspondence

R.M.B.F. Christmas Gifts

SIR,—As the time for the distribution draws near, once more I would like to remind your readers of our Christmas Gifts Fund. Will those who have not yet sent in their contributions please do so as soon as possible? It is my earnest hope that the response to my appeal may be a particularly generous one this year, as it would be such a real act of kindness if we were in a position to give £3 to each of our old people instead of the usual £2. Please send contributions to the Honorary Treasurer, Royal Medical Benevolent Fund, 1, Balliol House, Manor Fields, Putney, London, S.W.15, marked "Christmas Gifts."—I am, etc.,

THOS. BARLOW,
President.

Social Medicine and the Physician

SIR,—The paper by Prof. John Ryle (Nov. 20, p. 633) brings out the field of social medicine and the importance of its modern setting. There is nothing in the broad principles which are set out in it that any individual can quarrel with, provided he approaches the problem of twentieth-century existence in an objective manner. We all have our emotional responses and reactions; our prejudices, our likes, and our prides (false or otherwise); each feels he holds the best solution. Nevertheless, the only right biological approach is for us to recognize our emotional colouring and the biological variation in our judgment and our reaction to our environment. We need to keep our minds open and be prepared to accept error in ourselves, and if so shown by experience or reason unhesitatingly to start afresh. The optimum biological result is always practicable if the need and urge are strong enough. Prof. Ryle makes two apparently contradictory statements: "The advocacy of these changes [reorganization of medical services] is no more a function of social medicine than . . ."; and the quotation from Sigerist: "The physician must assume leadership in the struggle for improvement of conditions."

The issue is surely that the aetiological factors in disease are not only organisms and endocrine disturbances but a whole chain of factors, including the Chancellor of the Exchequer, who states that 10s. a week is all he will authorize as an old-age pension. Treatment is not only in the hands of the physician, surgeon, nurse, and dispenser, but also in the hands of the almoner, the health worker, the social worker, the insurance company and friendly society, the M.O.H. and the borough council, the builder and the company director, the parliamentarian and the peer, right up to the Minister of Health and all his colleagues in the Government (including the Ministers of Food and of Labour), who, by vote or otherwise, have a casting voice in health legislation. The physician is only the first and the last link in this circular chain of factors, which is attached to the patient at its two ends. Surely the old dictum that we cannot mix medicine and politics is untrue. Is it not rather that we do mix them even now, that they cannot be kept apart, but that we each and all of us must preserve our integrity and objective impartiality in judgment? With accuracy of medical knowledge it becomes our duty to inspire our legislators, and with equal force it is their responsibility willingly to accept inspiration. At some time we must all ask ourselves: Is anything more important than prevention of preventable ill-health?—I am, etc.,

St. Mary's Hospital, W.2. A. ST. G. HUGGETT.

Early Recognition of Cancer

SIR,—The needs in connexion with the treatment of cancer seem to be the same as with any other difficult problem: (1) to appreciate the problem by getting to know all the facts; (2) to consider the problem rationally; (3) to plan the solution of the problem; (4) to prosecute the action decided upon with vigour.

The chief facts are that: (*a*) cancer is a fatal disease; (*b*) because of this there is a distorted mental attitude on the part of some patients and some doctors; (*c*) early cancer (if recognized) can be cured in a high proportion of patients, using present methods; (*d*) present-day methods are local in application and palliative rather than curative in the majority of advanced cases, but not in all; (*e*) technical developments have been and are rapidly taking place in connexion with present-day methods aiming at improved treatment; (*f*) there is much room for improvement in the organization of the service and in the skill of individuals carrying out treatment, by both surgery and radiation.

If it is considered worth while treating cancer at all, then, in the light of these facts, to which many others could be added, it seems obvious that:

1. An attempt must be made, using the best psychological approach to the whole population, to treat patients as early as possible. This is the most difficult, but would probably be the most fruitful source of an improvement in the cure rate of cancer, as was implied by Dr. Walter (Oct. 16, p. 493). The way in which it should be done requires careful consideration and an experimental approach. Probably propaganda among the doctors would be very important.

2. As Dr. Brailsford says (Oct. 30, p. 555), research in "two or three institutes" rather than "multiple duplications of present activities" is desirable, so as to employ in the best way possible the means at our disposal, and to explore the possibility of new methods. This, of course, is the basic idea behind both the Cancer Act and the Faculty of Radiologists' memorandum in connexion with radiotherapy. If the information provided by such regional organizations as are envisaged in this memorandum is fully utilized by adequate statistical analysis, progress will be rapid. This statistical analysis on routine treatment of patients must be regarded as a fundamentally necessary research requiring nothing short of regional organization.—I am, etc.,

London Hospital, E.1. F. ELLIS.

Attack on Pulmonary Tuberculosis

SIR,—In the admirable second Varrier Jones Memorial Lecture, published in your issue of Nov. 13, Sir Arthur MacNalty states that the Nottinghamshire County Council, which established the Sherwood Village Settlement in 1936, is a notable exception to local authorities. Nottinghamshire is certainly one of the notable exceptions, but the Cheshire County Council started a small colony in Wrenbury Hall, near Nantwich, in 1922, and was, therefore, early in the field, and continues to this day.

Though the place of the village settlement may be relatively small, it is highly important. I therefore hope that no departmental committee will reiterate the findings of the Departmental Committee of 1919–20—namely, that it is better to develop the existing settlements and not start new ones. Let there be a number of large regional settlements, and an awakening of all health authorities to the necessity for this, even if it demands a national board.

Reference is made to the reports of the Interdepartmental Committee on Rehabilitation and of the M.R.C. Committee on Tuberculosis in Wartime, in which it is suggested that industry should be made to rehabilitate the tuberculous in their organizations. Rehabilitation of the tuberculous is a medical matter and the responsibility of the health authorities. They should employ, in the various departments of the authority, the consumptives who need rehabilitation. Possibly, if this were done, all capable of full or partial rehabilitation would be absorbed.—I am, etc.,

Market Drayton. PETER W. EDWARDS.

Financial Allowances in Tuberculosis

SIR,—From your correspondent's letter (Nov. 20, p. 657) and from those received after my letter in the *Times* on this subject it does not seem to be realized that local authorities have had power since the Public Health Act, 1936, to provide assistance to all persons who have suffered from tuberculosis. It only remains for a member of a county or borough council to move that the powers under that Act be implemented. The relevant sections are 173 (2) and 174. The recent Government scheme is merely the enforcement of part of the duties which should

already have been carried out by local authorities, and it seems a good opportunity for medical councillors to speak out.—I am, etc.,

GRIFFITH EVANS,
Chairman, Caernarvonshire County Committee for Care of the Tuberculous.

Transplantation of Ureters into Large Bowel

SIR,—Owing to an oversight, possibly connected with the necessity for drastically compressing the address on this subject which you kindly published in your issue of Oct. 30 (p. 535), I have omitted to mention an important point in the description of the operation. A little more than half-way through the section dealing with preparation and operation and referring to the suture used to draw the ureter into the bowel it is stated: "Both ends of the stitch on the ureter are now threaded on a small round needle, which is passed through the hole into the bowel and out through the whole thickness of its wall half an inch beyond the aperture." Three lines further down it is stated: "The ends are then tied firmly, but not so tightly as to cut through the tissues." Of course, it should have been made clear that after the ureter is safely drawn into the bowel one of the ends of the fixation stitch must take a good bite of the muscular wall of the bowel, after which the two ends are drawn taut and securely tied. In this way the ureter is anchored against the inner surface of the bowel.

I very much regret the omission, which was inadvertently made, but for which I am alone responsible.—I am, etc.,

British Postgraduate Medical School, W.12. G. GREY TURNER.

Wartime Diet for Peptic Ulcer

SIR,—It would be a pity if this very important subject became obscured in a debate on details. Dr. Wrathall Rowe is in the thick of the industrial front and suffers from a peptic ulcer. He earns our gratitude for his attempt, based on acute personal experience, to improve the lot of the ulcer patient (Oct. 9, p. 464). Sir Arthur Hurst, after a lifetime spent in the study of alimentary disorders, writes from the cloistered and cultured seclusion of Oxford (Oct. 23, p. 523). Presumably he does not suffer from a peptic ulcer, and views the problem with that detachment and wisdom for which Oxford has ever been famed. His statement that "apart from gross roughage, there is no food intrinsically bad for ulcer patients" seems to me not too sweeping a generalization as Dr. Rowe suggests, and no new physiological principle is involved, since the digestion of ulcer patients is usually excellent. Likes and dislikes are, of course, important, but are peculiar to the patient rather than to his ulcer, and chocolate is certainly one of those foods for which many people have an idiosyncrasy.

My chief purpose, however, in writing this letter is to emphasize a principle with which many ulcer patients would agree—namely, that the diet is of much less importance than the stomach into which it is going. The well-being of the patient when he takes his meals, the principle of the initial state, is paramount. A tired stomach cannot digest food. Too long have we laid emphasis on the diet and given our patients elaborate lists of foods, often unobtainable, to the exclusion of a proper direction in those rules which should govern the taking of meals; the frequent feeds, adequate mastication, rest before the evening meal, week-end leisure, curtailment of tobacco and alcohol, and so on. To a large extent these determine whether good digestion shall wait on appetite.

To-day, as perhaps never before, our out-patient clinics and consulting rooms are full of tired folk, often with dyspepsia, some of them with peptic ulcer. Anxiety undoubtedly plays a part, but I am convinced, with Dr. Rowe, that the fatigue of intense and sustained mental effort plays a much larger one. Likewise, the constant change of hours of duty, notable particularly, and not unavoidable, in transport workers, and a too frequent alternation of day and night shifts in factory workers—these are inimical to the proper rehabilitation of the ulcer patient. Many man-hours are being lost for want of a little organization, and while supporting Dr. Rowe in his plea to the Ministry of Food for a greater accessibility to the more easily digested foods for ulcer patients I would support even more strongly his appeal to the Ministry of Labour for some improvement in their working conditions.—I am, etc.,

Birmingham. T. L. HARDY.

SIR,—In his letter to the *Journal* of Nov. 13 (p. 619) Dr. J. B. Wrathall Rowe suggests that I cannot be aware of the difficulties under which industrial ulcer patients labour, as I write from "the quiet retreat of Oxford." If he were to visit wartime Oxford he would realize that most of the wives of the many thousand industrial patients here are engaged in part-time, and often whole-time, employment, shopping is difficult, and domestic help almost unobtainable. The fact that chocolate makes Dr. Rowe sick is no reason why the large majority of ulcer patients who do not share his idiosyncrasy should not make use of it as an occasional change from milk for their intermediate feeds. It would be interesting to know what evidence he has that meat leads to a far more abundant secretion of HCl in his stomach than cheese. If it is subjective and not the result of comparative test-meals, it is valueless. I have seen many patients, including several doctors, who for years had taken alkalis and belladonna for "acidity" till a test-meal showed that they really had achlorhydria.

If meals are taken, for example, at 8 a.m., 12 noon, 4 and 8 p.m., two pints of milk will provide 8-oz. feeds at 10 a.m., 2, 6, and 10 p.m., and one during the night. This is surely enough to keep the pylorus sufficiently active to prevent the stomach from being empty at any time during the day.

Dr. Rowe approves of my advice to give phenobarbitone to anxious patients with duodenal ulcer. But why not give it alone instead of in a mixture containing sugar, chloroform, and a homoeopathic dose of ext. hyoscyam. liq.? The dose of the latter he prescribes is equivalent to about 1/1120 gr. of hyoscyamine or atropine after breakfast and lunch and 1/560 gr. at bedtime. Numerous investigations have demonstrated that anything less than 1/100 gr. has no action on the secretory or motor activity of the stomach.—I am, etc.,

Oxford. ARTHUR HURST.

Agents Provocateurs

SIR,—During the past week the newspapers have contained reports of legal proceedings which must be of interest to every medical man in the country. In the course of the evidence in a case it was disclosed that three *agents provocateurs* consulted a medical practitioner at the instigation of New Scotland Yard, and after giving a false name in one case, and false addresses and false medical histories in all cases, they obtained certificates to the effect that they were unfit for work. The three men were subsequently examined by the police surgeon and found to be fit for work. The medical practitioner was later arrested and proceedings brought against him under the Defence Regulations. It was admitted in court by a police witness from the C.I.D. that he had instructed the three police agents to give the false information, to feign sickness, and that he had also told them what to say. Finally, all these facts were admitted by the legal representative of the Director of Public Prosecutions. The charges against the doctor were dismissed, and costs of ten guineas awarded against the prosecution.

The *Times* of Nov. 11 summarized the magistrate's comments as follows:

"The police officer himself has agreed that the three men who went to the doctor were *agents provocateurs*. Not only ought such methods not to be encouraged, but let me say for my own part that I hope no such cases, where such methods are employed, will be brought into this Court. The facts in this case, he said, are that these three men went to the doctor at different times. They themselves said they were told what to say by the police officer. They had each of them admitted that the stories they put up to the doctor were wholly untrue. That kind of thing was wrong. The very basis of the relations between doctor and patient was honesty. In his view the doctor had reasonable cause to believe that these three certificates which he gave could be given in good faith because of the stories which were told to him by the men."

The importance and implications of this case should not be lost sight of by the profession, and it is to be hoped that the strongest possible protest will be sent by the various professional bodies to the Home Secretary and also to the Minister of Health. At the same time the thanks of the profession are due to the magistrate for his condemnation of the police methods and to the Press of the country for the publicity given to the proceedings.

Mutual confidence is the only possible basis between a doctor and his patient. The patient's history of his symptoms is so

essential for accurate diagnosis that, except in gross or advanced disease or in the case of known malingerers, the doctor is bound to accept it as part of his medical evidence. The difficulties in connexion with medical certification are great, and the doctor usually grants a certificate only after a consideration of the patient's symptoms, the physical manifestations of disease, and a consideration of the patient's temperament and work. And even with the best will in the world there will on occasions be differences of opinion as to whether a patient is, or is not, fit for work. But what is the hard-pressed doctor to do when confronted with a patient who may after all be a police decoy acting under instruction, and whose story is a tissue of lies from beginning to end? The simulation of symptoms may be easy and the simulation of signs may not be difficult to those who have been carefully "coached." And so the unwary doctor acting in good faith may become the victim of a police conspiracy.

The activities of *agents provocateurs* are better known on the Continent than they are here. But even in this country these agents have been employed both by the Government and by the police for a hundred years or more, and under war conditions the number of *agents provocateurs* has increased with the increase in offences against wartime legislation or regulations. The use of such methods is condemned by all but a minority of citizens, and the Englishman still prefers to commit his crime without the assistance of police or other agents. The use of *agents provocateurs* is contrary to our conception of justice as a nation; it discredits the executive and the police, and it sows distrust in the community.

The obvious implications of the employment of *agents provocateurs* will be plain to every medical man, but there are two aspects which may less easily be recognized. First, the present trend of legislation in this country directed to the public health, is its concentration on industrial health rather than on health a concern for the health of the worker rather than for the health of the citizen. Correspondingly the doctor is becoming more and more an appendage of the industrial machine and more and more concerned with the patient's capacity to work. We may give grants to early cases of pulmonary tubercle in order to expedite the patient's return to work, or we may give extra food or perhaps in the future compulsory vitamins in a concern for increased production. These measures may be necessary under war conditions, but the doctor's job, even in a nation of shopkeepers, is to keep or get the citizen well and not merely to keep him at the bench or lathe.

The second implication is far more sinister. If lying *agents provocateurs* are to be employed by Ministries or by the police to trap the unwary doctor into giving "certifications, notifications, reports, or documents of a similar nature," how does the doctor stand in relation to the disciplinary activities of the General Medical Council? Before the G.M.C. there is no subpoena of witnesses and no evidence on oath, and the doctor who has been convicted on the evidence of *agents provocateurs* may find himself in a hopeless position and without the safeguards of legal proceedings or any real right of appeal. In the future the position may be as follows: somebody suspects the doctor of something and informs the Minister of Labour or some other Minister, the Minister informs Scotland Yard, Scotland Yard informs its decoys, the decoys secure a conviction despite their lies, and then the G.M.C. (a body subject to the Privy Council) orders the erasure of his name from the *Medical Register*.

The attempt to secure a verdict in the present case by the use of methods such as were admittedly used here is of the greatest importance both to the public and to the medical profession. In the brave old world of the future not all the health centres in the country will be of much avail if the confidence between the doctor and his patient is to be destroyed by the incredibly stupid and clumsy methods of officials. What would have been the meaning of a verdict of guilty in a case such as the present one in the face of such activities of the prosecution? What are we to think of the intelligence and ability of the Government and police officials who were responsible for advising and concocting such a type of prosecution? It will be a bad day when the first duty of a doctor when asked for a medical certificate is to satisfy himself that he is not dealing with a "copper's nark." Finally, it is an ironical commentary on the situation that the doctor who was involved in the present case comes from a country where an arbitrary Government acts through the secret police and the *agent provocateur*, a country with which we are at present at war.—I am, etc.,

London, W.1. REGINALD T. PAYNE.

Parodontal Disease

SIR,—I am in agreement with Dr. Boyd-Cooper (Nov. 13, p. 632) both in congratulating your correspondent on his summary of the conservative treatment of parodontal disease and in calling attention to the fact that this treatment falls within the province of the dental surgeon. I cannot, however, agree with your correspondent of Oct. 23 (p. 534) that the *x*-ray finding of "much osteitis" or the existence of "clinical effects from septic absorption" constitutes a reason for extracting the teeth. There is abundant evidence that the bone, however much it may be irritated, resorbed, or sclerosed as a result of toxic absorption from the ulcerated gingivae, is and remains sterile.

The main criteria in deciding for or against extraction are whether the teeth are still reasonably firmly attached to the bone, and whether the pockets can be obliterated, the gingival ulceration healed, and the gum margins thereafter kept hard and well keratinized.—I am, etc.,

St. Mary's Hospital. E. WILFRED FISH.

Dentistry and Medicine

SIR,—The letter of Dr. Michaelis (Nov. 6, p. 590) raises many points of interest, and to reply adequately would require more space than could be allotted in the *Journal*. A strange sequence of events led me to work as a dental mechanic during my student days, and I qualified in medicine and in dental surgery in 1919. My practice of dentistry when a surgeon probationer was greatly appreciated in the XVth Destroyer Flotilla in 1916, and the dual qualification has been invaluable in subsequent years at sea in the Royal Navy and the Merchant Navy; but I see little, if any, advantage of a dual qualification in ordinary civilian practice. The dental curriculum is adequate to make the dental surgeon thoroughly efficient for the work he wishes to undertake without spending valuable time in qualifying in obstetrics, forensic medicine, paediatrics, and general medicine and surgery. It is already long, and in addition to the courses in anatomy and physiology and general medicine and surgery there are the special dental subjects. I believe, however, that the general practitioner should have more thorough knowledge and appreciation of dental conditions and collaborate more with the dental surgeon. My brief comments on some of Dr. Michaelis's eight points may perhaps stimulate further discussion.

1. I would consider a newly qualified dental surgeon quite competent to extract teeth for school children and to undertake fillings as required. In any case of impaired health, and where the best treatment of any individual case might be a matter of question, collaboration with the family doctor or with the school medical service would no doubt be available. For a young and newly qualified dental surgeon, with no "overhead" expenses or equipment to provide, is not a salary of £500 p.a. reasonable?

3. In my opinion it would be a disadvantage to make a dental surgeon undertake the complete course in medicine and surgery as is the case in all other medical and surgical specialties. By all means let us have far greater collaboration and social intercourse. As regards remuneration, I imagine a good middle-class dental practice is more profitable and in many respects less exacting than an ordinary general practice.

4. Dental surgery must be an integral and very important part of any complete health service.

6. What prejudices exist against dentistry? The Americans think our dentists are very inferior to their own, probably on account of less conspicuous prosthetic work and the unhappy state of affairs before the Act of 1921.

7. There are many doctors who do not appear to realize the importance of a healthy mouth and fail to insist on dental treatment for patients who present themselves with gastric symptoms, toxaemia, and languidness, to mention only a few of the common ailments which may be of dental origin.

More than 22 years ago, when I began practice as a general practitioner, unqualified dental practitioners outnumbered the qualified by 2 to 1 in my district. The practice of dentistry was forced upon me by a succession of their patients with broken teeth and abscessed gums, and a dental practice grew as a healthy "side-line." Eventually it became necessary to abandon dentistry entirely or to cater for it properly. A kind of "group practice" developed, and at one time I had two medical assistants, a qualified dentist, and two dental mechanics. We each had our specialties, and one acted as anaesthetist. I have the unhappy feeling that this development did not favourably impress any of my professional neighbours and colleagues.

The collaboration of the dental surgeons with plastic units, mentioned by Dr. Michaelis, is particularly useful on account of the dentist's experience of dental mechanics and his ability to make accurate and well-fitting splints of vulcanite, plastics, and other materials. A great, and financially the most profitable, part of dental practice is the provision of dentures, commanding large fees for the best dentures with a metal base, down to the N.H.I. scale. Fillings at the N.H.I. scale seldom give a reasonable return for the time taken. Most of the dentist's time is occupied in prosthetic work, scarcely demanding a very intimate knowledge of medicine and surgery, though a malignant growth should be recognized and referred to the doctor. A dentist's time is occupied in patching up or replacing defective teeth. As the health of the nation improves dental caries should become a rarity. It is surely a medical problem to preach diet and to hunt for "occult" disease which may be a cause of dental caries. A dentist, though a professional man, an expert anaesthetist, and having a considerable knowledge of medicine and surgery, is a highly skilled mechanic or engineer rather than a physician or diagnostician.—I am, etc.,

Huddersfield. S. H. WADDY.

Therapeutic Fallacies: Calcium in Haemorrhage

SIR,—Drs. Linnell and Thomson are would-be iconoclasts of many ancient idols, the devotees of which will doubtless rise up and take notice, but in one instance I hope to show they are themselves in grievous error. Calcium, *properly administered*, is a potent remedy for all kinds of haemorrhage. Given by the mouth the salts of calcium are rapidly absorbed and rapidly excreted, and while in the passage in certain cases they may be useful, the effect is so evanescent as to be useless in haemorrhage. This was explained to me over 30 years ago by Prof. W. E. Dixon, late Reader in Pharmacology at Cambridge. The salt must be fixed by injection into the body tissues. Within a short time I had the opportunity of trying it on a case of haemoptysis, hypodermically. The result was complete cessation of the haemorrhage by the next morning, *but* a patch of gangrene the size of a shilling at the site of injection. There was no trouble with the eventual healing, and both patient and doctor were satisfied.

Under the professor's advice all subsequent injections have been intramuscular: they are often painless, but there may be some pain at the site of injection, I believe due to leakage from the muscle; what happens I do not know, but there has never been anything to show outwardly and no weakness of the muscle. Once I saw a musculospiral paralysis when a friend had injected into the upper arm, and he must have got near the nerve, but it cleared up completely after some weeks.

Prof. Dixon's suggestion was to give 1 gr. of calcium chloride in about 100 minims of water, and this is the strength I have always found satisfactory. If an ounce of calcium chloride is dissolved in 4 oz. of water the solution is sterile and remains so. Four minims drawn into a syringe and then diluted gives the necessary dose.

I found the results uniformly successful in all manner of haemorrhages, and they were published, but for some years they were clinical results only; but again Prof. Dixon came to my aid by sending Dr. Vines, who was about to investigate the action of the parathyroids on calcium and I could watch the clinical side. Dr. Vines then was able to state that, after the injection of the 1 gr., the ionic Ca of the blood steadily increased to a maximum at the end of six hours; it then more slowly decreased and was back to the old level in 24 hours. This knowledge has been of great use in severe haemorrhages, such as haematemesis, by giving the injections every eight or twelve hours, and in this case even continuing them daily for a day or so; for in the alimentary canal the clot is liable to digestion and it is well to pile up the clot on the distal side.

I have seen one fatality: when I first saw the case it was the morning after the injection into the buttock, and apparently every blood vessel in the thigh was thrombosed. I was assured only 10 gr. diluted 1 in 100 had been given by a misapprehension. With this result in my mind my hair stood on end when I read of the large doses given intravenously, apparently without bad effect or good. I think this must be comparable to giving it by the mouth, and that it is excreted almost as fast as injected, and it never reaches the tissues to be ionized. As to the shortening of the clotting time, I had no possibility of expert help and found my amateurish results incomparable with factors changing each hour, and therefore I am perfectly willing to concede Hunter was right, supposing the salt was injected and not swallowed. But even then is *time* the essential factor; may it not be a change in the consistency of the clot?

That "there is no pharmacological evidence that calcium increases the coagulability of the blood" is surely disproved by my evidence of the gangrene produced in the two cases I have seen due to errors. The test-tube has not all the reactions of the body. As to chilblains, I am in complete agreement with my friends the iconoclasts. Dr. Vines proved this many years ago, and the results have been published: that there is no calcium deficiency with an ordinary chilblain, but there is a distinct decrease when it is broken or ulcerated, as is almost universal in other ulcerations.

In justice to the memory of Prof. Dixon, who suggested the method and whose help and enthusiasm I gratefully acknowledge, I trust you will find room for this protest against a dictum which puts the clock back thirty years.—I am, etc.,

St. Ives, Huntingdonshire. W. R. GROVE.

Artificial Insemination

SIR,—I will begin with Dr. L. J. Bendit's letter in answer to mine of Sept. 4. Surely the mistake is in Dr. Bendit's mind? I have never so far as I know mistaken either men or women for cattle. In some of our cases where donated semen is used the donor is chosen by the husband and his wife—usually because both know and like him for his finer qualities. Where we choose the donor we put heredity, intelligence, and an admirable character above the breadth of his shoulders in importance, though, of course, a moderately sound physique and good general health are advisable. I do not think that the solution we are discussing in any way approaches the best that we know—namely, the creation of a child by two people deeply in love and mentally and spiritually in accord: it is only, and should only be, used where it is the joint desire of both husband and wife as a means of settling their own particular difficulties. We do not need to consider those of both sexes whom Dr. Bendit quotes as being revolted. They are hardly likely to apply for donated semen, and no one is likely to force such a thing upon them.

Of the child we can none of us yet speak with authority as the number of children in this country born in these circumstances is infinitesimal. I can only return to my original statement that to my mind the couple whose understanding has been sufficient to weather the greatest of all setbacks to their sexual relationship—namely, the mutual knowledge of the husband's sterility—will produce in these circumstances an atmosphere in which the wife's child should flourish; lastly, I would say that it is not for Dr. Bendit or me, or even necessarily for a woman's husband, to assume the right to demand the sacrifice of the woman's primal need for maternity. The value of the physical act of motherhood varies greatly from woman to woman, and none but the individual can decide how much she is prepared to sacrifice in this life and what for. In any case adoption is an ever-present solution should she prefer it.

In answer to Dr. Rickword Lane I would add that it is not, of course, in anybody's interests to assist people to bring into this world children mentally and physically handicapped. It is interesting to think that it is still not legally possible for the medical profession to produce abortions in cases where

from every point of view the offspring is likely to be highly undesirable.

I have in some part answered Dr. Leitch's letter—I do not think that the woman who has achieved a child by donated semen will be more liable to "child fixation" than any other woman. The sterility of her husband does not imply his impotence, and sexually she may be completely satisfied. The marriage which is sterile through permanent impotence needs special consideration, but if it has persisted through the desire of the woman not to make use of her legal right of annulment she is generally greatly devoted to her husband and will not withdraw from him for other reasons. I do not leave the husband out of my calculations. We should always make sure that the desire for pregnancy by donated semen is jointly held by both husband and wife. We are not responsible for men who make such a request on impulse without proper consideration. In any case we always point out all the pitfalls in the procedure. The child need not and should not ever know—it should be a matter of honour to bring him up as though in every particular he were a product of the marriage.

I would thank Dr. R. H. Boyd for his letter. Dr. Ethel McCandless has raised a very interesting point which I feel I can hardly discuss here. The artificial insemination of unmarried women raises so many issues, perhaps most important of all being the status of the child and the quality of its upbringing. We should surely make our decisions in regard to married people before tackling the monumental problem of the possibilities for unmarried ones. Lastly, the question in Dr. Pearse Williams's letter. I do not think adoption meets the case of the man who urgently desires personal paternity any more than it meets that of the really maternal woman, but his is a difficult problem to solve satisfactorily. Extramarital progeny would not necessarily, if achieved, give him the satisfaction he needs nor would his wife be likely to wish to adopt them. Perhaps the desire for fatherhood is rarer than the desire for motherhood—in my experience more marriages survive permanent sterility in the female partner than in the male.—I am, etc.,

London, W.1. MARY BARTON.

Wartime Day Nurseries

SIR,—From Dr. Marjorie Back's answer to my letter concerning State nurseries it is obvious that I did not make my points sufficiently clear. To begin with, I must explain that, although I have had many years' experience in nursery schools, for the past year I have been in charge of a wartime nursery for children aged 2 to 5 years, open from 7.45 a.m. to 6 p.m. Some of the 2-year-olds are among the first to come and the last to go, which is a break of 10 hours away from their mothers. I shall be pleased for any visitors to spend the entire day in the nursery for as long a period as they wish; they will find no "crying for the last three hours of the day."

All that I said in my last letter was prompted by my experience here. I am convinced that it is possible to run wartime nurseries on the same lines as nursery schools, and to make them equally successful, in spite of disadvantages and drawbacks—of which conditions here provide plenty—both as regards inadequate buildings and unqualified staff. The staff consists of myself, two nursery assistants of limited experience, and three young probationers. We have a very good health record. There have been several epidemics in the town, but we have kept clear of them all. Our average attendance over the past 12 months has been 25; we take 30 children. We have a nurse who visits daily and a doctor pays a weekly visit; teaching and medical staff work together very happily and successfully.

I suggest that all wartime nurseries for children of 2 to 5 years should be run entirely independently of the "under 2" section and placed under the charge of nursery school teachers, who understand and can plan for the child's mental care and development, as well as for his physical well-being.

With regard to the "under 2s," I agree with Dr. Back that they are a very different proposition, and since their needs are definitely physical, as opposed to educational, they do not come within my sphere, and I have no comment to make about "0 to 2 nurseries" beyond the fact that they do not seem advisable, unless to meet an urgent social need. As regards the matter of infection, no one would argue that the danger is not a very real one; but I feel that the risk is worth taking, when one considers the remarkable degree of all-round development of the children, and the contribution the mothers are therefore able to make to the war effort.—I am, etc.,

Scarborough. BARBARA R. ABELSON.

Anaesthetist's Third Hand

SIR,—Fl. Lieut. P. S. A. Heyworth (Oct. 16, p. 486) is to be congratulated on his praiseworthy attempt at solving the problem of the "aching fingers" of the anaesthetist and of the subsequent areas of soreness in the jaw of the patient.

He states that it may be a dangerous gadget in the hands of the occasional anaesthetist, but does not say why. Surely the answer lies in the fact that from the point of view of maintaining a free airway anaesthetized patients can be divided into two main classes: (1) those in whom it is sufficient to support the jaw with a finger under the chin, usually people with teeth which meet in good occlusion; and (2) those, unfortunately the greater number, in whom it is necessary to lift the lower jaw by placing a finger behind the angle on each side; these patients are usually edentulous, or have teeth which meet in mal-occlusion.

The drawing also shows two common causes of difficulty in maintaining a clear airway: (1) the pillow is shown to be under the head only, instead of being under the head and the shoulders; (2) the head is resting on the occiput instead of being turned to one side and left in a position of slight extension. It is often not sufficiently appreciated that in the lighter planes of anaesthesia (as suggested by the figure of 10% ether in the illustration) there is sufficient muscle tone in the jaw muscles for the patient to maintain his own airway. When the plane of anaesthesia is deepened to obtain abdominal relaxation the jaw muscles also lose their tone, and with the head lying square on the pillow gravity can exert its full effect in producing respiratory obstruction by the general flaccidity of the pharynx and the falling back of the tongue. At this stage an airway of such a length as to lie behind the base of the tongue will relieve the obstruction.

It is also important that the harness should be so adjusted that the face-piece makes just sufficient contact to prevent leaks (especially in closed circuits) but does not press the jaw back.—I am, etc.,

London, W.1. M. W. P. HUDSON.

"Fatigue" Fractures

SIR,—The recent paper on march fracture by Flight Lieut. H. H. Fouracre Barns (Nov. 13, p. 608), following so soon after a paper on the same subject by Squad. Ldr. Flavell (*Lancet*, July 17, 1943), emphasizes the frequency with which this type of fracture occurs in time of war, but it clouds rather than clears the air, since traumatic fractures are introduced while their differentiation is inadequately discussed, and, indeed, it is difficult to see why they were included.

I have recently shown that these march fractures of the metatarsals are almost certainly "fatigue" fractures of bone (and indeed it has been widely agreed that this is so), and that "fatigue" fractures are by no means found only in the metatarsals (*Brit. J. Radiol.*, Sept., 1943). Before 1942 I had laboriously collected 14 examples occurring in the tibia over a period of 10 years (*Brit. J. Surg.*, July, 1942), but once recorded in this country the condition attracted attention, and within 5 months I then saw radiographs of 5 more examples in the tibia. Furthermore, reports of isolated examples seen in the femur are steadily appearing in our journals. Now the incidence rate in the tibia is at least five times that in the femur (and fibula), and yet tibial examples are not being reported in this country.

Since "fatigue" fractures have yet to be widely recognized here, it is perhaps timely to point out that they are of importance because even in the metatarsals, but more often in the tibia, they have been misdiagnosed from time to time as "sarcoma" or Ewing's tumour. Furthermore, they *may* amount to occupational disease, and men and women in the Services suffering from these disabilities should not only be treated adequately but assessed, with a full knowledge of the facts, in relation to any claim for pension; for the condition will,

in fact, frequently be "due to war service." This point is given emphasis by an example which I recently encountered in a youth of 17 years who had been carrying 1-cwt. bags of coal on his back, and who developed "fatigue" fracture of the body of his 5th dorsal vertebra (*Brit. J. Radiol.*, Nov, 1943), a condition which I do not think has been previously recorded in this country, if, indeed, at all.

Thus it appears that the time is ripe for a search for "fatigue" fracture not only in the metatarsals (where it is so easily diagnosed) but in the tibia, fibula, femur, os calcis, pubis, and spine, since the study of the condition in these various sites may be expected to shed further light on the determining causes of the more common fracture to which the incorrect name of "march" fracture has become affixed. Where are the examples in this country? Do they exist undiagnosed, or is there a real low incidence rate compared with that in Europe and Scandinavia? If the incidence is, in fact, relatively low, what are we to infer from this?

In conclusion, may I point out that the term "fatigue" fracture, which I have suggested, refers to fatigue or "exhaustion" of *bone* and not to fatigue of the individual. It is used in the same sense in which one refers to fatigue occurring in metals. It is necessary also (in view of the confusion in the literature) to emphasize that fatigue fractures are entirely different from Looser's *Umbauzonen*, with which they have been grouped by some authors, and for which they are still likely to be mistaken. The aetiology, pathology, progress, and treatment of Looser's zones all differ from those in "fatigue" fractures.—I am, etc.,

Christie Hospital and Holt Radium Institute, Withington. J. BLAIR HARTLEY, Honorary Radiologist.

Vincent's Infection during Arsenical Treatment

SIR,—Squad. Ldr. E. C. O. Jewesbury's article on the misuse of intravenous N.A.B. for Vincent's infection (Sept. 18, p. 360) has been criticized in subsequent correspondence. Major J. J. Davis (Oct. 9, p. 464) and Dr. R. C. Wofinden (Nov. 13, p. 622) postulate drug resistance as an explanation of the refractory state, but if intravenous N.A.B. is an effective remedy how did the organisms become drug-resistant and why were they not cleared by the early injections?

The view is widely held that Vincent's ulceration will ultimately heal with little more than simple mouth washes, but in persistent cases the organic arsenicals do appear to exert a favourable influence on cases not associated with gross tissue destruction.

I have seen several cases of stomatitis and ulceration of the mouth in the neighbourhood of the molar teeth during anti-syphilitic treatment. All my cases, in addition to intravenous neoarsphenamine, have been receiving intramuscular injections of bismuth compound; and oral ulceration, especially around the molar teeth, is a recognized manifestation of bismuth toxicity and independent of the deposit of bismuth sulphide pigmentation commonly found in infected mouths.

In cases with ulceration after preliminary N.A.B. treatment the apparent drug resistance of the organisms may be due to the failure of the intravenous arsphenamine to penetrate from the ulcer bed into the infected pocket of debris and slough, and this view is supported by the success of local N.A.B. treatment; but is it not possible that the refractory cases reported are really bismuth ulceration with the superadded "opportunist" infection by Vincent's organisms, which, it is agreed, are present in normal as well as diseased mouths? Nobody has yet advocated the use of N.A.B. for bismuth ulceration; it is usually successfully treated by local measures, with or without sulphonamide or thiosulphate internally.

For simple Vincent's infection, when local treatment is inadequate, I have found the administration of oral stovarsol (4 gr. twice daily for 7 days) to be an effective remedy. I have not found N.A.B. necessary, and I regard it as undesirable in view of the potential dangers of this form of treatment. Further, attention should be drawn to the occurrence of secondary syphilitic infection *sometimes apparent only in the mouth or throat*, and, in view of the essentially prolonged and full treatment of secondary syphilis, in spite of the rapid clearance of lesions, it would appear that a blood Wassermann test should be collected before the first injection is given, if this form of treatment is adopted. So important is this factor that I think the trade advertisements should at least advocate this precaution in their claim of beneficial responses in Vincent's ulceration with N.A.B. therapy.—I am, etc.,

London, W.1. DAVID ERSKINE.

Fusospirillary Balanitis

SIR,—It is a merit of Dr. G. M. Thomson to have drawn attention to the aetiology and treatment of fusospirillary balanitis (Oct. 16, p. 485).

The rapid onset of signs and symptoms, especially the profuse yellowish discharge, makes usually a very intimidating impression on the patient. Afraid of a gonorrhoea he attends as a rule a V.D. clinic in preference to the general practitioner. Often a subsequent inflammatory phimosis has already developed, in which case the question whether a venereal infection is present as well has to be carefully investigated. A reliable examination for gonococci can be extremely difficult if the external orifice cannot be properly reached through the narrow phimotic opening, and for this reason the coexistence of gonorrhoea might be overlooked or discovered only with delay.

Another possibility one has to reckon with is the coincidental presence of subphimotic eruptions of syphilitic origin. The typical sclerosis of a primary sore, which is usually palpable from outside through the unretracted prepuce, might be still or already missing, and there are primary sores which never develop a sclerosis. The inguinal glandular swellings we find in fusospirillary balanitis are often just as indolent as those due to syphilis. As balanitis and phimosis are common features in diabetes one has to bear in mind that a fusospirillary balanitis can develop as a superimposing condition on the base of an originally diabetic balanitis.

As regards treatment of fusospirillary balanitis I had always a quick and fully satisfying result within 3 to 5 days with the following method. If the prepuce can be retracted the glans penis and the subpreputial space are cleansed with saline or a mild solution of potassium permanganate and painted all over with a 3% solution of silver nitrate. Following that the whole area is dried up by gentle dabbing and dusted over with bismuthi subgallas powder (*B.P.C.*) A very thin layer of cotton-wool is spread over the glans and kept in position by a probe while the prepuce is slowly replaced. This procedure is performed twice a day if possible, but I found one treatment a day usually sufficient. If a phimosis is present the treatment is carried out after preliminary irrigation of the preputial sac by means of probes armed with cotton-wool. Care has to be taken that all subpreputial applications reach the coronary sulcus.

The retractibility of the prepuce has to be restored in the shortest possible time to avoid undue delay in discovering the coexistence of a venereal infection. For this reason I would not advise leaving the treatment to the patient himself.—I am, etc.,

Bolton. S. F. BERNDT.

Psychiatry at the Cross-roads

SIR,—When reading Dr. J. S. Horsley's letter on this subject (Nov. 13, p. 620) I was reminded that an individual's experiences tend to colour his outlook and bias his judgment. This is especially so when that experience carries high emotional tone, either pleasant or unpleasant. Some of us have unfortunately had experience of the Jehovah-like superintendent whose attitude to all and sundry is revealed by the repetition *ad nauseam* of that significant word "my." We should, however, not permit such experiences to over-determine our judgment. The problem of the medical superintendent in the mental hospital must not be divorced from that of his counterpart in the general hospital, especially in those larger general hospitals which have their own senior resident staff of "consultant" rank. It is only fair to medical superintendents in general to state that they are just as much concerned with the problems of their functions and relationships—to local committees (lay), Ministries, medical officers of health, consultants, resident medical senior and junior staffs—as with their personal status and position. Dr. Horsley would know this if he had access, as I have, to the deliberations of the Medical Superintendents Society, of which many mental hospital superintendents are members.

That the mental hospital can be the centre of a really progressive and comprehensive psychiatric service despite the handicaps of an "obsolete system" is abundantly proved by the existence to-day of such services in widely different localities. Such progress is certainly not universal, but a progressive superintendent with vision (and a willing staff!) can do wonders in a backward district and with a backward committee. If an A.M.O. finds—and it should not take him long if he possesses the qualities enumerated by Dr. Horsley—that his M.S. is so emotionally immature that he conforms to Dr. Horsley's description, it is up to him either to resign or to seek appointment elsewhere in a more progressive district. Neither of these courses is much hardship to a young man at the beginning of his career; especially as he will have gained some of the necessary basic experience of mental hospital work during his unsatisfactory appointment. Incidentally a "bad" hospital can always be recognized by the high resignation rate of its junior medical staff.

I do not wish to deny that there is much to be put right in the psychiatric household: there is, and this is the time to do it. I only wish to point out two things: (1) that under existing conditions suitable personnel can do really good psychiatric work; and (2) that the vast majority of superintendents are as conscious of the defects of their office (and sometimes their personal defects) as are their juniors (who are not by any means always aware of their personal defects). Superintendents are seeking to plan, for the future, ways and means which will enable them to render greater service to the smooth and efficient working of the hospitals in which they work.—I am, etc.,

Ryhope, Sunderland. T. MARTIN CUTHBERT.

Paper Control and Advertisements

SIR,—Your annotation (Oct. 23, p. 518) makes one ask whether so much space *must* be devoted to non-professional advertisements. I seldom read them myself, but illness has provided me with the time this week. I find no less than fifteen full pages of advertisements for proprietary medicines and appliances except for 7/12ths of a page dealing with books. Most of them take up half a page; all of them could have put the salient points into a quarter-page or less. Many are garnished with pictures or diagrams, which should be hardly necessary to convince intelligent or hard-bitten doctors.

Personally, I would rather have a larger subscription and no non-professional advertisements, but this is not likely to be popular. Why not limit all advertisements to a quarter-page with no useless pictures and charge the same as for a half, or even more? If the manufacturing chemists have something to tell us it should be worth it to them. They are not exactly hard hit by the war and cannot spend money on samples and circulars. The space so saved could then be devoted to the waiting scientific articles.—I am, etc.,

Bideford. S. C. WAKE.

Obituary

E. CHARLES LINDSAY, C.B.E., F.R.C.S.

Mr. Ernest Charles Lindsay was born in 1883, the son of the Rev. George Lindsay of Christchurch, New Zealand. He was educated at Otago University, taking his B.Sc. in 1904. Coming to London he entered the London Hospital as a student, and it remained his home for the whole of his career. He passed the Conjoint Examination in 1909, and obtained the Fellowship of the Royal College of Surgeons in 1912. At the London Hospital he held several appointments, including that of surgical registrar, and in 1920 was elected to the honorary staff and became assistant director of the surgical unit. During the last war he had served with the R.A.M.C. with the rank of major, and in 1919 he was awarded the C.B.E.

At the London Hospital Lindsay rapidly developed a great reputation both as a teacher and a surgeon. For several years he was surgeon to Poplar Hospital and the Royal Masonic Hospital, while he was examiner in surgery at Cambridge University and at Queen's University, Belfast. He was a sound surgeon with excellent judgment and operative skill of a very high order; but he will be chiefly remembered for his outstanding personality. In his student days he had a magnificent physique, and he was one of the leading members of the hospital Rugby team. It must have been all the harder for him when he was overtaken by ill-health which involved many operations. In spite of every difficulty he carried out his work with amazing courage and without the slightest diminution in its high quality, and was in full harness when he passed away.

It is not too much to say that there was no one who knew Charles Lindsay who did not love him and who did not admire his unfailing equanimity and his superb courage. In him the London Hospital has lost one of her noblest sons, his colleagues one of their dearest friends, and all of us—students and staff alike—a splendid example of what a fine surgeon and a great gentleman can be.

H. S. S.

F. CRAVEN MOORE, M.D., F.R.C.P.

We regret to announce the death on Nov. 18 at Duckyls, near East Grinstead, Sussex, of Emeritus Professor Frederick Craven Moore, who was born in Manchester in 1871 and spent the whole of his valuable working life in that city He studied science at Owens College, and graduated B.Sc. in biology of the Victoria University in 1891, M.Sc. in physiology in 1894, M.B., Ch.B. (with first-class honours) in 1895, and M.D. (with gold medal for his dissertation) in 1898. During a brilliant student career Craven Moore won the Dauntesey medical scholarship, the junior and senior Platt Physiological Exhibitions, and the University scholarship in medicine, and after qualifying he was awarded the J. H. Agnew scholarship in diseases of children. He was engaged in the study and teaching of pathology up to the year 1901, and then took the M.R.C.P. and set up in practice as a consulting physician. He was elected F.R.C.P. in 1910, by which time he had been appointed to the honorary medical staff of the Manchester Royal Infirmary and of the Ancoats Hospital. Both institutions made him consulting physician when he retired from the active list.

Craven Moore held for a number of years the chair of systematic medicine in the Victoria University of Manchester; he had been president of the Manchester Pathological Society and, later, of the Manchester Clinical Society. He was also a member of the Pathological Society of Great Britain and Ireland and of the Association of Physicians. He joined the B.M.A. in 1896, was a member of the Arrangements Committee at headquarters in 1928, and held office as vice-president of the Section of Medicine at the Manchester Meeting of the Association in 1929; for two years before then he had served on the Council of the Royal College of Physicians. He published papers on pathological subjects, and more recently on investigations into disorders of digestion, contributing articles on cholesterin and on diseases of the stomach to the *Practical Encyclopaedia of Medical Treatment*, and papers read before Sections of the Royal Society of Medicine. Outside his professional life Prof. Craven Moore had been a keen skater and golfer, and he was devoted to horticulture and Oriental art.

Dr. JOHN MACPHERSON JOHNSTON, formerly medical superintendent of Tor-na-Dee Sanatorium, Aberdeenshire, died in retirement at Blairgowrie on Nov. 3. He was born in Forfarshire in 1881 and was educated at Dundee High School and Edinburgh University. He graduated M.B., Ch.B.Ed. in 1903, taking the English Conjoint qualifications in 1908 and the D.P.H. in 1910. Dr. Johnston held a number of full-time posts in London after qualification, including those of assistant M.O. at the Bethnal Green Infirmary and at the Northern Fever Hospital, and assistant M.O.H. for the Borough of Hornsey. On the outbreak of war in 1914 he received a temporary commission in the R.A.M.C. and served until 1918. He had joined the B.M.A. in 1912 and was Representative of his Division at the Portsmouth Meeting of 1923 some time after his appointment as head of the Tor-na-Dee Sanatorium at Murtle.

We regret to announce the sudden death on Nov. 8, at his home in St. Martin's Avenue, Epsom, of Dr. EDGAR GEORGE CLEMENT DANIEL, aged 74. He was born at Epsom, where his father, William Clement Daniel, M.D., practised, and he went up to Emmanuel College, Cambridge, in 1888 from Westminster School, taking his B.A. in 1891. After clinical study at St. Thomas's Hospital he qualified in 1895 and graduated M.A., M.B., B.Ch. at Cambridge in the following year, by which

time he had held the post of house-physician at St. Thomas's. Returning to his native town Dr. Daniel practised there with much success and became a leading figure in the medical profession of the neighbourhood. From the time of his election in 1911 he did good work for the B.M.A., representing the Kingston-on-Thames Division at two Annual Meetings, and served as chairman in 1927–8; a few years later he became president of the Surrey Branch, and at headquarters he was for many years on the Post Office Medical Officers Subcommittee. During the last war Dr. Daniel was civilian visiting surgeon to the County of London War Hospital at Horton. He held a number of local medical appointments, was lecturer for the St. John Ambulance Association, the Central Midwives Board, and the British Red Cross Society, which made him an honorary life member. Outside his professional work he took an active part in the Boy Scout movement, and enjoyed camping, cycling, and photography. N. E. W. writes: The death of E. G. C. Daniel came as a great shock to his colleagues in Surrey. He was a regular attendant at the County Panel Committee meetings and other meetings of the profession. He seldom spoke, but when he did his opinion was listened to with great respect and the advice tendered was always wise and judicious. He was one of the few remaining types of the old school: handsome, courteous, dignified, unruffled, and in every sense of the word a gentleman. No one ever heard him speak ill of a colleague and no one could even imagine him doing a petty or mean act. We benefited by his life. We suffer loss by his death.

Dr. GEORGE HAMER LEIGH, ex-consultant tuberculosis officer of the Lancashire County Council, died on Nov. 12 at Lancaster. He was born in 1876, and qualified M.B., Ch.B. Manchester University in 1911, and later took his M.D. and D.P.H. After several house appointments he undertook private practice for three years, and before joining the County Council as assistant tuberculosis officer in 1914 he was senior medical officer at the Westmorland Sanatorium, Grange-over-Sands. In 1934 he was promoted consultant tuberculosis officer, and became responsible for the dispensary work in a large area extending from Lancaster to Chorley, containing a population of 277,000. In addition he was visiting physician of the Lancaster Pulmonary Hospital. He retired from the County Council service in 1940 on attaining superannuable age, but continued to devote his time and energies to the interests of his profession, being the chairman of the North-Western Tuberculosis Society in 1942. Loyal and most conscientious, he earned the confidence, respect, and affection of his colleagues.

Dr. GEORGE FREDERICK ROGERS died on Nov. 16 at the house of his sister, Mrs. Pitts, at Yelverton, Devon, aged 76. He took the Cambridge B.A. from Gonville and Caius College and went on for his clinical course to the London Hospital, where, after graduating M.B., B.Ch. in 1893, he held the posts of receiving-room officer, house-physician, and resident accoucher. In 1896 he proceeded M.D., and returned to Cambridge as a demonstrator of anatomy under Prof. Alexander Macalister; he also examined in anatomy for the university. For a time Dr. Rogers was a Home Office inspector under the Cruelty to Animals Act of 1876, and it was while carrying out these duties that he contracted the illness which led to his retirement from active work. He spent his later years travelling in many parts of the world. Many Cambridge medical graduates of the older generation will regret the passing of "G. F.," whose great height and kindly welcoming laugh made him a conspicuous figure in the Anatomy Department and in the streets and college courts.

Dr. HERBERT GEORGE CRONK, who practised for many years at Repton, died on Nov. 4 in his 90th year. He began the study of medicine at Jesus College, Cambridge, where he played his part in the revival of the College rowing, and after taking his degree he went to St. Bartholomew's Hospital. He qualified M.R.C.S. in 1879, took his Cambridge M.B. in 1880, and was in turn house-physician, house-surgeon, and intern midwifery officer at Bart's; he also worked at the Victoria Park Chest Hospital as clinical assistant. When at Bart's he developed skill in obstetrics under Matthews Duncan, a great asset in the country practice which, together with his post as medical officer to Repton School, was his absorbing interest for 40 years. Between leaving Bart's and going to Repton Dr. Cronk returned to Cambridge for a time as demonstrator of anatomy. He joined the British Medical Association as long ago as 1880 and had thus been a member for nearly 64 years at the time of his death. While in single-handed practice, as he was for long, he could not attend meetings of the B.M.A. frequently or of the Obstetrical Society of London, of which he was an early member. On retirement in 1923 to Welwyn Garden City his interest in medicine did not cease and his greater opportunities enabled him to keep abreast of new developments right up to his last few years. His son, Dr. H. Leslie Cronk, is County M.O.H., chief school medical officer, and chief tuberculosis officer for Hampshire.

Dr. JOHN FREDERICK WILLIAM SILK, consulting anaesthetist to King's College Hospital, died in retirement on Nov. 18, aged 85. He was born at Gravesend, and from Cranbrook Grammar School matriculated at London University and entered King's College in 1875 with a science exhibition from the Clothworkers' Company. He obtained the L.S.A. in 1879, the M.R.C.S. in 1880, and at the London Final M.B. examination in 1881 he gained honours in obstetrics and forensic medicine. After house appointments at King's College Hospital and the General Infirmary at Leeds he served for a time as anaesthetist to Guy's Hospital, the Royal Free, and other hospitals in London, and in 1893 returned to King's as anaesthetist and lecturer on anaesthetics. Dr. Silk did valuable work as a member of the Building Committee of the new King's College Hospital. He was one of the founders of the Society of Anaesthetists, of which he became secretary and, later, president. During the last war he received the rank of lieut.-colonel and was appointed consulting anaesthetist, first to the Malta Command, and later to the Home Command. He was the author of *Modern Anaesthetics*, which reached a second edition in 1920, and of the section on anaesthetics in Cheyne and Burghard's *Surgical Treatment*. He retired from King's in 1921, and afterwards settled at Dartmouth.

The Services

Col. J. B. Hance, C.I.E., O.B.E., V.H.S., I.M.S., has been appointed Honorary Surgeon to the King in succession to Col. T. C. Boyd, I.M.S., ret.

Col. R. A. Money, M.C., E.D., Australian Military Forces, has been appointed C.B.E. (Military Division) in recognition of gallant and distinguished services in the Middle East during the period May, 1942, to October, 1942.

CASUALTIES IN THE MEDICAL SERVICES

Wounded.—War Subs. Capts. A. M. Gardner and T. E. Moody, R.A.M.C.

Reported missing.—Capt. S. Lask, R.A.M.C.

Died.—Lieut.-Col. H. C. Tait, M.B.E., I.M.S.

DEATHS IN THE SERVICES

J. C. G. L. writes: May I crave a little space to pay a tribute of affection from old colleagues and friends to the memory of Major JACK HORNE, I.M.S. (ret.), who died at Strathpeffer on Oct. 31 after a long and distressing period of almost complete physical immobility resulting from a progressive infective arthritis for which he was retired from the Service in Feb., 1925? Elsewhere his friend and former class-fellow in Edinburgh has expressed in fitting words the charm of Horne's personality, his love of Nature and good books, and his reluctance to dwell on the bodily infirmity which had removed him, while yet in the prime of life, from the scientific pursuits for which he was so admirably fitted. In India he had been a member of the Medical Research Department of the Service, and during the last war was in charge of a bacteriological laboratory at Ismailia. Here he was in close association with the work of the Hygienic Institute in Cairo, of which Dr. Charles Todd was then director. After the armistice he served for a time on the staff of the Bombay Bacteriological Laboratory at Parel. Fortunately, before he was completely laid aside from active work he was able for a time (1925–8) to continue the study of bacteriological problems at the Lister Institute, where he undertook with great zeal and interest an experimental inquiry into the method of spread of furunculosis of salmon and trout, a disease recognized for the first time in England (1911) by Arkwright and Masterman. A full report of his work prepared for the Ministry of Fisheries in 1928 showed *inter alia* that in trout farms no evidence could be found of the presence of furunculosis, that a proportion of live trout taken from the river proved to be carriers of the causative organism, which could be isolated from their blood, and, further, that gobies placed in artificially polluted tanks became infected after a few weeks. These when placed in unpolluted tanks containing fresh running water were able to pass on the infection to healthy contacts. During the past 16 years Horne found solace from his enforced inactivity in unbroken correspondence with old friends, and many young ones too who had learned to love him and drew inspiration from the bearing of one in whom so complete a victory of mind over matter had been achieved. Ave atque Vale.

No. 45

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended Nov. 13.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1943					1942 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	41	4	24	2	1	50	5	25	—	5
Deaths		—	—				1	—		
Diphtheria	819	50	181	117	48	940	42	213	65	10
Deaths	13	1	3	5	—	17	1	6	4	—
Dysentery	158	35	87	—	—	148	21	50	—	2
Deaths				—	—				—	—
Encephalitis lethargica, acute	1	—	—	1	—	2	—	1	1	—
Deaths		—					—			
Erysipelas			53	5	1			68	11	—
Deaths		—								
Infective enteritis or diarrhoea under 2 years				20					71	
Deaths	64	7	11	15	2	66	10	18	18	8
Measles	557	50	67	56	2	7,731	244	409	6	42
Deaths	—	—	—	—	—	7	—	—	—	—
Ophthalmia neonatorum	89	6	22	—	—	83	2	14	1	—
Deaths										
Paratyphoid fever	4	—	—	—	—	3	2	2	—	
Deaths	—	—	—	—	—	—	—	—	—	—
Pneumonia, influenzal*	781	48	45	—	7	556	28	15	2	8
Deaths (from influenza)	46	6	20	3	1	22	1	2	—	—
Pneumonia, primary			259	12				165	14	
Deaths		37		4	12		—		10	11
Polio-encephalitis, acute	2	—				—	—			
Deaths		—					—			
Poliomyelitis, acute	20	4	1	3	—	16	1	1	22	—
Deaths		—					—			
Puerperal fever		2	26	—	—		2	16	4	—
Deaths		—					—			
Puerperal pyrexia†	158	7	11		4	153	9	12		2
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	3,236	246	403	56	87	2,880	176	392	58	54
Deaths	1	—	—	—	—	—	—	—	—	—
Smallpox	—	—	—		—	—	—	10		—
Deaths				—	—				—	—
Typhoid fever	5	—	2	8	2	13	—	1	7	2
Deaths	—	—	—	—	—	1	—	—	—	—
Typhus fever	—	—	—	1	—	—	—	—	—	—
Deaths				—	—				—	—
Whooping-cough	1,902	174	220	21	24	1,155	75	28	86	6
Deaths	7	—	2	1	—	4	—	2	—	—
Deaths (0–1 year)	316	37	67	32	22	355	35	62	43	22
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	4,368	695	638	200	126	4,133	628	618	192	142
Annual death rate (per 1,000 persons living)			14·4	13·1	‡			13·9	12·8	‡
Live births	5,836	697	861	353	245	5,794	674	841	415	254
Annual rate per 1,000 persons living			17·6	23·2	‡			17·4	27·7	‡
Stillbirths	199	23	35			208	24	40		
Rate per 1,000 total births (including stillborn)			39					45		

* Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

† Includes puerperal fever for England and Wales and Eire.

‡ Owing to evacuation schemes and other movements of population, birth and death rates for Northern Ireland are no longer available.

EPIDEMIOLOGICAL NOTES

Influenza

From all accounts there have been outbreaks of influenza in different parts of the country, and we understand that these are due to influenza virus A. The returns for the week ending Nov. 20 show a large rise in deaths attributed to influenza in the 126 great towns—a rise to 106 from 46 in the previous week. This is about three to four times the usual number of deaths from influenza during this period of the year. In the largest of recent epidemics, 1936–7, the weekly deaths did not exceed 100 until the last week in December. For the 5 weeks from week ending Oct. 23 to week ending Nov. 20, 1943, deaths were respectively 13, 25, 31, 46, 106. The figures for the corresponding weeks last year were 18, 11, 19, 22, 21. The present outbreak is commented on in a leader printed on another page.

Discussion of Table

In *England and Wales* rises were recorded in the incidence of whooping-cough by 147, of acute pneumonia by 105, of diphtheria by 49, and of dysentery by 12 cases. Measles was "fairly steady" with only 4 more notifications, and scarlet fever was down by 138.

In only a few counties was there any variation in the trend of whooping-cough; the largest increases were in London with 66 more, Yorkshire West Riding with 51, and Staffordshire with 41 more cases; the greatest drop was in Lancashire by 33. The small rise in the notifications of acute pneumonia was fairly general throughout the country. The incidence of scarlet fever fell mainly in Yorkshire West Riding by 53 cases and in Durham by 38. There was little local variation in diphtheria incidence, and only in the West Midland region was the rise at all marked. This disease is concentrated chiefly in the North, and Lancashire, Yorkshire West Riding, and Durham contributed 280 of the total of 819, while the twenty-two counties in the regions of London, South-East, South-West, South Midlands, and East had a total of only 172 notifications.

No considerable fresh outbreak of dysentery was reported during the week. The largest centres of infection were in London with 35, Middlesex with 26, Kent with 15, Lancashire with 15, Surrey with 12, and in Essex with 10 cases.

In *Scotland* the notifications of dysentery fell by 69 and those of acute pneumonia by 47. In Edinburgh 47 cases of dysentery were reported, compared with 85 in the preceding week. The decline in pneumonia was mainly contributed by Glasgow, where 25 fewer cases were notified.

In *Eire* a case of typhus fever was notified in Cork, Fermoy R.D. The incidence of diphtheria remained at the high level of the preceding week, 32 of 117 cases occurring in Dublin C.B.

In *Northern Ireland* 21 more cases were reported from the outbreak of diphtheria in Londonderry C.B.

Quarterly Return of the Registrar-General for Scotland

A birth rate of 18.5 per 1,000 was recorded during the September quarter, being 1.1 above the average of the five preceding third quarters and the highest birth rate in any September quarter since 1931. The infant mortality was 55 per 1,000 live births—4 below the average of the preceding five September quarters, and the lowest rate ever recorded in any quarter. Maternal mortality was equal to 3.8 per 1,000 live births—0.6 below the five-years average. The general death rate was 11.3 per 1,000 and was 0.2 above the average of the five preceding third quarters. The death rate from all forms of tuberculosis was 70 per 100,000, and that from respiratory tuberculosis was 50; these rates are respectively 4 and 2 above the five-years average. The principal epidemic diseases accounted for 199 deaths—21 more than in the third quarter of 1942. The chief causes were whooping-cough 84, influenza 48, diphtheria 35, cerebrospinal fever 18. The marriage rate was 8.1 per 1,000, the lowest for any September quarter since 1932. The rate was 1.3 below that for the corresponding quarter of 1942, and 1.0 below the pre-war average (1934–8).

The Week Ending November 20

The returns of the notifications of infectious diseases during the week in England and Wales include: scarlet fever 3,098, whooping-cough 1,866, diphtheria 705, measles 556, acute pneumonia 978, cerebrospinal fever 51, dysentery 176, paratyphoid 4, typhoid 8.

Medical Notes in Parliament

Programme for New Session

The Speech from the Throne, which was read by the King in the House of Lords on Nov. 24 to open the new Session of Parliament, said it would be the primary aim of the Government to ensure that in the period of transition from war to peace food, homes, and employment were provided for the people and good progress made in rebuilding damaged cities. Fresh powers would be needed for these purposes. Parliament would, in the immediate future, be asked to make provision for the training and employment of disabled persons. Ministers would present to Parliament their views and proposals regarding an enlarged and unified system of social insurance, a comprehensive health service, and a new scheme of workmen's compensation. They would decide in the light of the Parliamentary discussions what specific proposals of legislation on these matters could be brought forward at this stage. Ministers would maintain and develop the measures of promoting the health and well-being of the people which had been so successful during the four years of war.

A general debate followed in the House of Lords on Nov. 24 and in the House of Commons on Nov. 24 and 25. No specific references were made to public health in these discussions.

Food for Belgium and Greece

Mr. STOKES on Nov. 10 said a great body of opinion in America and Great Britain desired the Government to do something to help the children and the nursing mothers of Belgium and to give a little further relief to the people of Greece. At present Greece received 15,000 to 20,000 tons of food a month. The Swiss-Swedish Commission working in the country and the Greek Government asked for a further 10,000 tons a month of fresh food. In Dec., 1941, 69,000 special food cards were issued in Belgium for tuberculous cases. Fifteen months later the figure went up to 109,000 cases. In Ghent 40% of the children suffered from rickets and 80% in other parts. Mr. EDMUND HARVEY said that in May, 1943, the State Department of the United States had estimated that at least two-thirds of the young persons in Belgium suffered from tuberculosis.

Replying to the debate, Mr. DINGLE FOOT said that in Belgium children and nursing mothers received nine pints of milk a week. There were shortages for children of school age, but the figures did not represent a starvation diet. Deaths in Belgium numbered 110,000 in 1940, 125,000 in 1941, 121,000 in 1942. A special exception had been made in allowing food to go to Greece, but no one should believe that the enemy derived no advantage from the scheme. To let relief foodstuffs in substantial quantities into German-occupied Europe would be a form of lease-lend to the enemy. The Government did not propose to lay itself open to this form of German blackmail.

The Case of Dr. Goldschmidt

On Nov. 23 Sir HERBERT WILLIAMS asked the Home Secretary what steps he proposed to take to prevent the police acting in future as *agents provocateurs*, as they did in the case against Dr. Goldschmidt, which was heard at the North London Police Court on Nov. 16. Mr. PEAKE, who replied, said that the police were well aware that the courts would always scrutinize most narrowly the evidence of any witness who could be represented as having encouraged or procured an offence which would not otherwise have been committed, and no action on the part of the Home Secretary was required to remind the police of the great care which must be taken in cases of this kind. He was not aware of anything in the case to which Sir Herbert Williams referred which need cause anxiety to a doctor who accepted in good faith a statement made to him by one of his patients.

In reply to supplementary questions Mr. PEAKE said that there was a clear distinction, which was well understood by the police, between incitement to commit an offence—which was wholly wrong and a disciplinary offence—and the employment of subterfuges in order to obtain evidence where habitual offences were reasonably suspected and there were no other means of securing the necessary evidence. The Home Office had noted the views expressed by the magistrate in this case and any necessary action would be taken. Dr. HADEN GUEST: Does Mr. Peake really think it is necessary to employ these offensive Gestapo methods against anyone in the medical profession? Does he not know that it is intensely resented that this should be done and that it is possible to find out what a doctor is doing otherwise than by this unfortunate procedure? In reply to another question Mr. PEAKE said that the police would not countenance the employment of *agents provocateurs*. This was not a case where there was incitement to commit an offence.

Tuberculosis of Bovine Origin.—Mr. BROWN, replying on Nov. 9 to Mr. Alfred Edwards, said bovine tuberculosis could only be distinguished with certainty from other forms by special laboratory procedure. In future, medical practitioners certifying deaths from this disease in which such tests had been carried out would be asked to indicate this fact. So far as was known no such distinction had been made in any certification.

Medical Policy Association.—On Nov. 23 Dr. MORGAN asked the Home Secretary if his attention had been called to the anti-Semitic propaganda carried on by the Medical Policy Association, London, and whether, in view of their effect on the war effort of this country, he had considered the desirability of a prosecution. Mr. Morrison said he had seen the first bulletin issued by this association, which, he assumed, Dr. Morgan had in mind. The document appeared to introduce, quite gratuitously, certain arguments which might be regarded as having an anti-Semitic basis, but it afforded no grounds for prosecution or for any other action on his part.

Medical News

On Thursday, Dec. 9, at 7 p.m., Mr. Arthur Mortimer, Deputy Director of Medical Supplies, Ministry of Supply, will give a lecture before the Pharmaceutical Society at 17, Bloomsbury Square, W.C., on "The Ministry of Supply and its Relation to the Pharmaceutical Industry." Members are invited to bring friends, and an opportunity for discussion will follow the lecture.

A meeting of the Royal Eye Hospital Clinical Society will be held at the hospital on Friday, Dec. 17, at 4.30 p.m., when Mr. Basil Graves will speak on "The Cult of the Eye and the Quest of Reality."

The Conjoint Committee of the Royal Medical Foundation of Epsom College will in February next award an annuity of £34 per annum to a spinster daughter of a duly qualified medical man. Candidates must not be less than 65 years of age, and their income must not exceed £91 5s. per annum. Forms of application may be had from the Secretary's Office, Epsom College, Surrey, and must be returned, duly completed, by the morning of Jan. 17, 1944.

The Ministry of Health has arranged for an allocation of glucose for the manufacturer of glucose tablets for diabetics. Ample supplies are available so long as the distribution is confined to persons suffering from diabetes.

The following forms of jaundice have been made compulsorily notifiable in the eastern region of England by regulations which come into force immediately: catarrhal jaundice, acute inflammation of the liver, acute necrosis of the liver, acute yellow atrophy of the liver, toxic jaundice, and infective jaundice. The Ministry of Health (Circular 2883) states that special investigations are being carried out at Cambridge, in collaboration with the M.R.C., into the epidemiology and pathology of infective jaundice, and for this work the fullest information is required about the incidence of the disease (which has been increasing) for a length of time over a substantial geographical area. Medical officers of health should send these notifications at the end of each week in a sealed cover to the Regional Medical Officer, 12, Queen Anne Terrace, Cambridge. If there are no cases a notice to this effect must be made. Cases of infective jaundice need not be entered in the ordinary weekly return of infectious diseases.

The 1943 editions of the Registers of Chiropodists and of Speech Therapists have now been published by the Board of Registration of Medical Auxiliaries. Copies can be obtained free by medical practitioners, hospitals, etc., on application to the acting secretary, Board of Registration of Medical Auxiliaries, B.M.A. House, Tavistock Square, London, W.C.1.

As from Jan. 1, 1944, all British-made insulin packings will be standardized. Each type and strength, of whatever make, will be readily identified by a distinctive colour scheme, while the unit strength per c.cm. will be displayed in bold figures on both label and carton. This is the result of collaboration between the manufacturers (Allen and Hanburys Ltd., Boots Pure Drug Company, Ltd., The British Drug Houses Ltd., and Burroughs Wellcome and Co.), from whom an explanatory card, printed in colours, may be obtained.

Dr. Jean McDowall, Colonial Medical Service, who has been missing since the fall of Singapore, is now officially reported interned in Sumatra Camp. Official information has been received that Dr. Margaret H. Thomson, M.B.E., is also interned in Sumatra Camp.

Guy's Hospital Rugby Football Club celebrated its centenary on the home ground at Honor Oak Park on Nov. 27 by playing a match against a XV from the London Rugby Union and afterwards by a dinner held in the pavilion with Mr. W. D. Doherty in the chair.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1.

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TELEGRAPHIC ADDRESSES.—EDITOR, *Aitiology Westcent, London*; SECRETARY, *Medisecra Westcent, London*.

B.M.A. SCOTTISH OFFICE: 7, Drumsheugh Gardens, Edinburgh.

ANY QUESTIONS?

Treatment of Undulant Fever

Q.—*I seek advice on the treatment of undulant fever in an otherwise healthy woman of 55, paying particular attention to the efficacy of vaccine treatment if such can be recommended.*

A.—The patient should be kept in bed during the febrile stages of the disease and treated on general lines. Aspirin gr. 10 or phenacetin gr. 5 should be given as required, for relief of pain. If the temperature rises above 104° F. it should be lowered two degrees by tepid sponging. The urine and faeces should be disinfected, and nursing precautions taken as in a case of typhoid fever. There is no specific cure for the disease. I should advise giving first a course of sulphonamide treatment, preferably sulphanilamide 1 g. t.i.d. for seven days, followed by a second course if there is a relapse. In the second course 1 g. should be given t.i.d. for 5 days, and then 1 g. twice daily for another two to five weeks, provided blood counts are made every week to see whether there is any diminution of the granulocytes. If this occurs the sulphonamide should be discontinued. Usually there is a leucopenia with a relative lymphocytosis in this disease, and the white cells increase in number during sulphonamide treatment. The occurrence of a rash or a rise of temperature, which may be drug fever, during the treatment is a further indication for discontinuing the sulphonamide.

An autogenous vaccine should be prepared from a blood culture, and this can be given, if there is a relapse, with the second course of sulphonamide treatment. The dosage is 25 to 50 millions at weekly intervals for several weeks. Brucellin was introduced in 1939. This is a filtrate of a culture of *Brucella* grown in liver broth, but it has not been very successful and may be dangerous. A preliminary intracutaneous test must be made to determine the patient's sensitivity. An alternative treatment is the intravenous injection of 50 c.cm. of immune serum on three successive days. The results have been disappointing. Protein shock therapy is successful in some cases; 50 to 100 millions of T.A.B. vaccine are injected intravenously. The temperature rises often to 105° F. with a rigor, falling to normal in about 30 hours. In some cases this is successful in abolishing the fever. It must be used only in young and strong adults, as there is a danger from collapse. To conclude, I should advise in this case a trial of sulphonamide treatment, together with a vaccine if it can be obtained.

Pyelitis in a Diabetic

Q.—*A well-built man aged 63 years had ten years ago an acute attack of pyelitis, and it was then discovered he was diabetic. He was given insulin (80 units daily). He has had intermittent attacks of pyelitis ever since. These attacks are accompanied by fever ushered in by rigor. The urine contains pus cells, sugar, and acetone. To my knowledge the urine has never been sugar-free. For a few days of the attack there is complaint of pain in the lumbar region, dull aching in character. Treatment at the first illness was alkaline; then sulphonamides were given, and as a prophylactic hexamine and methylene blue. But none has influenced the condition to any extent. The urine persistently shows pus cells on centrifuging, and the patient continues to have bouts of fever. Otherwise he is normal. He has never been abroad. I would be grateful for suggestions as to treatment.*

A.—A good deal of further investigation is necessary in this case to complete the diagnosis and offer any certain prospect of curing the urinary infection. (1) Carbohydrate intake and insulin dosage should be so adjusted as to abolish the glycosuria. Normal urine is a good culture medium for some bacteria, but it is greatly improved from their point of view by the addition of glucose. (2) Radiography and pyelography should be undertaken to determine whether there is a renal calculus or any anatomical abnormality predisposing to infection. (3) If such conditions have been excluded, the proper treatment of the infection depends on the causative organism, which should be ascertained by bacteriological examination of the urine. Most coliform infections respond to sulphonamides, but coccal infections are most resistant—*Strep. faecalis* particularly so: only mandelic acid treatment will usually control this.

Doctor Practising as Dentist

Q.—*Can a registered medical practitioner practise dental surgery although not on the dental register, supply and fit artificial teeth, and recover for the same in a court of law?*

A.—Dental surgery is a part of medical practice, and the Dentists Act, 1921, in forbidding dentistry to the unregistered, expressly excepted the registered medical practitioner. He is, therefore, allowed to practise dental surgery, and to recover his agreed or reasonable charges at law. Unless, however, his name is also on the *Dentists Register* he cannot be paid from National Health Insurance funds, for the Dental Regulations (doubtless through an oversight) define "dentist" as a person who is duly registered in the *Dentists Register*, and not as one who is entitled to practise under the Dentists Acts.

How Sulphonamides Act

Q.—*What is the latest explanation offered of the mode of action of the sulphonamide drugs? Does modern work suggest that all of the group act in the same way?*

A.—The only satisfactory explanation of the sulphonamide effect ever propounded, and undoubtedly the correct one, is that which emerged from the work of Fildes and Woods in 1940. They showed that the action of sulphanilamide on streptococci was specifically and quantitatively neutralized by *p*-aminobenzoic acid. This is a substance essential for bacterial growth which can be formed by bacteria themselves or derived in small quantity from infected tissues; sulphanilamide in sufficient concentration prevents its being utilized in the metabolism of the bacterial cell, and growth consequently ceases or is retarded. The effect has been described correctly as one of starvation; it is an interruption of an essential process in nutrition. Bacteria deprived of their source of energy and power of reproduction fall an easy prey to the natural defence mechanism of the body. The action of other sulphonamide compounds has been shown by accurate cultural tests to be similarly neutralized by *p*-aminobenzoic acid; the nature of their action is therefore the same in all cases. Other susceptible bacteria are attacked in the same way, and diseases on which these drugs have no effect are those caused by bacteria for which *p*-aminobenzoic acid is not an essential growth factor.

Some Problems of Infertility and Impotence

Q.—*"A" is a young man on whom a fertility test has been performed because his wife had no children. His semen has been reported deficient in the number, motility, structure, etc., of the spermatozoa. There is no history or evidence of disease. "B" is a man of 36 who, after an enthusiastic sex life, finds himself impotent. "C," a happily married man, is able to have intercourse normally but has never had a seminal emission. There is no history of past disease.*

"D," a man aged 39, had 4 children, of which the youngest is 14 years old. About six years ago he married again, and has been childless since. It is now found that his semen contains many immature forms, a high percentage of mature forms showing morphological abnormalities. No motility was observed. He has apparently always enjoyed good health, and has no obvious disease now. His testes feel normal. He drinks about one gallon of beer per day.

"E," an officer aged 38, has complained to me of sterility. He reports that gynaecological examination of his wife reveals no abnormality. On general examination of the officer nothing unusual was discovered. Last June examination of sperm within 20 minutes of ejaculation showed no motile spermatozoa. He then had a course of injections of extract of pregnant mare's serum, 200 units thrice weekly, for six weeks. Microscopical examination of sperm within 10 minutes of ejaculation, following on this treatment, showed numerous morphologically normal but non-motile spermatozoa. He is the father of one child six years old.

A.—*Patients "A," "D," and "E" above:* There is increasing recognition of the need for investigating the husband's fertility in cases of sterility, and some observers have recorded that the husband may be at fault in some 40% of cases. It is important that the technique for obtaining and examining the seminal fluid is a valid one. Rubber condoms usually contain chemical substances which destroy the majority of the spermatozoa. A method of extracting such toxic substances from the rubber condom is described by Tynen and Ranson (*Lancet*, 1942, **2**, 425). Even then it is advisable to transfer the specimen immediately to a glass specimen tube with a waxed cork, and to keep at room temperature until the examination. This examination should certainly take place within a period of six hours and preferably a shorter time than that. The writer of this answer always examines a specimen produced by masturbation in a room adjoining the consulting room, but some patients object

to this procedure. An alternative is to take a cervical specimen from the wife as soon after coitus as possible.

Some idea of the number and motility of the spermatozoa can be obtained by a direct examination of the seminal fluid. A more complete technique is described by Belding (*Amer. J. Obstet. Gynec.*, 1934, **27**, 25), but wherever possible such examination should be left to an expert who has the opportunity of frequently conducting it. Normal seminal fluid should contain a hundred million spermatozoa per cubic centimetre. In cases of sterility the number may be less than a hundred thousand per cubic centimetre, or spermatozoa may be absent. Motility and morphology of the spermatozoa are other important factors. No absolute conclusions should be drawn from a specimen unless there has been an interval of seven days after the last coitus. The treatment of male sterility is, on the whole, disappointing, although occasionally apparently good results follow. Some biologists suggest that testicular biopsy should be carried out before treatment commences, because such biopsy may show the uselessness of any hormone therapy. It is probably illogical to treat with hormones sterility due to past infections. As regards gonadotrophic hormone, that of pregnant mare's serum or of pituitary gland is the one that acts on the seminal vesicles, as distinct from the interstitial cells. Sometimes small doses of testosterone appear to be effective, possibly by stimulating the gonadotrophic function of the pituitary. The vitamin B complex and vitamin E have also been advocated. Should these measures prove of no value, as is often the case, unfortunately, I think it advisable to speak of relative infertility rather than label a man completely sterile. This saves a good deal of psychological trauma.

I have not dealt with those rare conditions in which there is a mechanical obstruction between the testes and the ejaculatory duct. Such an obstruction might be indicated by normal testicular biopsy and a sterile spermatic fluid. Such cases would be referred to the urogenital surgeon, although the surgical results are poor.

Patient "B": The commonest cause of impotence is psychological, and this may be the fundamental factor even after an "enthusiastic sex life" of some years' duration. The cause of such psychological impotence may be elucidated by an interview with an intelligent physician familiar with the broad principles of psychology, and a few such interviews may help the patient to recover his potency. Other cases, however, must be referred to a psychiatrist or psychotherapist, and may require a long period of psychological treatment. The prognosis for someone who has already been potent is usually good, but the prognosis for someone who has never attained potency is variable. Before, however, concluding that the condition is psychological, and even in the presence of other psychological stigmata, the patient should be considered from the organic point of view. Syphilis is a cause of impotence, and it may act through the central nervous system (e.g., tabes), or by direct action on the testis (destruction by gummata). Mumps complicated by orchitis may lead to fibrosis of the interstitial cells and resulting impotence. Diabetes may be complicated by impotence, especially if inadequately treated. Hypopituitarism results in hypogonadism and impotence. Other endocrine conditions (i.e., thyrotoxicosis and adrenal neoplasms) and any general morbid condition of some severity may be associated with impotence. Therefore any investigation of the cause of impotence should include a thorough general clinical examination, a Wassermann reaction, and an examination of the basal metabolic rate if there is any indication of an endocrine disability. Gonorrhoea (complement-fixation serological test) may cause sterility but rarely causes impotence.

Patient "C": The commonest cause of failure to have a seminal emission in the presence of normal intercourse is a psychological disorder, and such a case should be investigated and treated on these lines. The condition may, however, follow certain forms of surgical interference with the sympathetic nerves and prostatectomy. Lumbar ganglionectomy does not affect the sexual act, but presacral sympathectomy abolishes ejaculation. Prostatectomy does not disturb erections, but the seminal fluid is retained in the prostatic cavity or passes backwards into the bladder, and is then voided with the next passing of urine. Mechanical obstruction—e.g., gonorrhoeal fibrosis—may prevent ejaculation in the presence of potency.

The Allergic Nose

Q.—*Is zinc-iontophoresis advantageous for hay-fever rhinitis and other types of allergic rhinitis treatment?*

A.—Zinc-iontophoresis is often of use in temporarily alleviating the acuteness of seasonal hay-fever or perennial rhinitis. It induces sloughing of the old membrane and the new membrane temporarily appears insensitive. But this lost sensitivity is soon regained, and any prolonged freedom from symptoms is rare. The process is painful, requires frequent repetition, and usually the later effects do not appear quite so prolonged or complete. As the hay-fever season lasts only a few weeks, one or two applications may tide the sufferer over the height of the season, but if permanency of results is required, either in seasonal hay-fever or in perennial vasomotor rhinitis, it does not compare with the proper testing of the patient, the avoidance of irritants, and desensitization.

Scarlet Fever

Q.—*I have noticed in the epidemiological table and notes that there has been during the past few weeks a rise in the notifications of scarlet fever. According to your comment, the notifications for the week ending Oct. 9 were the largest for several years. Is it possible to state briefly what this increased prevalence is due to? I should like also to know if there is any change in the nature of the disease, whether there is any apparent increase in complications, and whether a general practitioner should attempt to advise parents to have their children immunized against scarlet fever.*

A.—Scarlet fever ordinarily shows a steep upward rise in incidence during the autumn months, reaching a peak in November or December. Late autumn ushers in the first crop of colds and other respiratory infections, which perhaps help to spread the haemolytic streptococcus, although reassembly of schools is probably a more important contributor. Besides the annual seasonal wave, scarlet fever shows a longer periodic cycle of roughly 7 years in London and probably also in other large cities. The latest peak of this recurrent wave was due in 1942, but evacuation and school closure probably delayed it and we are experiencing it now. Last winter there was a considerable increase in incidence of scarlet fever, and again this autumn the notified cases have been more numerous than usual. These longer cycles may be associated with the state of immunity in the population, for during the peak period the infection tends to be more severe. Even so, scarlet fever is at present a mild infection with few complications—for example, post-scarlatinal nephritis is quite rare. Septic complications arise mostly as a result of cross-infection in hospital, and this additional risk together with the mild character of the disease is a strong argument for the home nursing of scarlet fever whenever that is possible.

Immunization has never become popular because it requires 4 to 5 injections of toxin which is apt to produce both local and general reactions; and, of course, this immunization protects only against the rash and not against further throat infections with the haemolytic streptococcus. In view of the administrative difficulties, therefore, and the mild character of scarlet fever, immunization is not at present to be recommended for children generally.

Alcohol and Vitamin B Deficiency

Q.—*On Nov. 13 you gave a summary of a lecture on alcohol and avitaminosis. After careful reading, especially of the last sentence, I get the impression that it is intended to suggest that alcohol in some way cancels out the vitamin B in the diet. This would seem to be contradicted by the American experiment quoted. Does alcohol actually deprive the body of the benefit of vitamin B taken in the diet, or is the deficiency caused only when the consumer has "gone off" his food to the extent of reducing his intake of the vitamin?*

A.—Alcohol does not "in some way cancel out the vitamin B in the diet," nor does it "deprive the body of the benefit of vitamin B in the diet." The alcoholic addict suffers from multiple vitamin deficiencies because he eats calories and not vitamin-containing foodstuffs. Alcoholic liquors, particularly spirits, are mainly alcohol and water and contain little or no vitamins. The high caloric value of the alcohol increases the requirements of the B vitamins. In addition the gastritis caused by the alcohol causes anorexia, and the two conditions together result in diminished absorption and intake of food. The alcoholic buys liquor in preference to food. A vicious circle is eventually set up. The neuritic symptoms of alcoholism are not due directly to the alcohol or to the alcohol inactivating vitamin B_1, but to a low intake and diminished absorption of the latter. The fact that alcoholic neuritis shows clinical improvement if the patient is given injections of vitamin B_1 whilst he is still drinking large quantities of alcohol shows that the latter does not cause the neuritis. It is likely that Wernicke's encephalopathy, Korsakov's syndrome, and the alcoholic psychoses are deficiency states due to lack of vitamin B_1 and nicotinic acid. Both of these are needed for the metabolism of carbohydrate, the combustion of which is the sole source of energy for nerve tissue. The alcoholic suffers from multiple vitamin deficiencies, but the results of vitamin B_1 deficiency (neuritis, anorexia, "beriberi" heart) are the first to appear.

Sedimentation Rate

Q.—*The* JOURNAL *of Nov. 6, p. 597, contains a note on sedimentation rates. In view of the divergence of opinion between your annotation and accepted authors as regards the limits of normal for the Wintrobe method (see Whitby and Britton, "Disorders of the Blood," 4th edition, p. 548), I would be grateful for further details on this, and especially for references.*

A.—In the answer it was stated: "With the Wintrobe method the normal sedimentation reading is 3 to 4 mm. plasma at one hour for a man and 9 to 10 mm. or less for a woman." Whitby and Britton (loc. cit.) say the normal reading for men is 0 to 9 mm. and for women 0 to 20 mm. M. M. Wintrobe and J. Walter Landsberg (*Amer. J. med. Sci.*, 1935, **189**, 102) state: "The average sedimentation at the end of 1 hour has been found to be in healthy men 3.7 mm. and in normal women 9.6 mm." They further state: "In

86% of the men examined the S.R. ranged from 0 to 6.5 mm., whereas in the same proportion of women the sedimentation rate ranged from 0 to 15 mm. In an additional 9% the S.R. ranged as high as 9 mm. in men and 20 mm. in women. These values probably represent the extreme range of normal variation under the conditions outlined." In a test such as this it is difficult, if not impossible, to draw a hard-and-fast line between the normal and abnormal. I have not met with a reading of 0 mm. in a normal individual, and I regard a reading of over 10 mm. in either sex as abnormal.

Burr Holes in Skull

Q.—*Could we have some more information about burr holes? Although presumably this kind of exploration should be done by a brain surgeon, it would, I think, help the general reader to know in what conditions burr holes are indicated, briefly how they are made, whether they are purely diagnostic or whether they have any therapeutic value, and what risk is attached to the operation.*

A.—Burr holes provide a simple method of exploring the intracranial contents without the necessity for turning a large osteoplastic flap. They are particularly valuable when the position of a lesion is known but its nature is unknown, or where a particular type of lesion is suspected but its position is uncertain. Thus in the first group burr holes can be made to differentiate a type of tumour or to establish the presence of an abscess. In the second group burr holes are made to find the position of a subdural haematoma. The procedure is not difficult. A small vertical incision is made in the skin, to the periosteum, which is stripped over an area the size of a halfpenny, and a small disk of bone, about 1/2 to 3/4 in. in diameter, is removed, care being taken not to penetrate the dura. The hole is washed out with saline, bleeding in the bone is controlled with Horsley's wax, and the condition of the dura is examined. When a subdural haematoma lies underneath, the dura is a dusky blue colour, in contrast to the rather flat white appearance it usually has—this is merely the blood-clot showing through it. If the brain is to be explored, as for an abscess, a tiny cruciform incision is made into the dura with a tenotome and a brain needle used for exploring. The dura can be examined by any competent surgeon, but exploration with a brain needle should be left to a neurological surgeon, for it may be necessary to proceed with an open operation if high pressure is encountered.

The value of making burr holes is purely diagnostic, and they should be carried out as an emergency measure if a subdural haematoma is suspected. It is best in these cases to make one in each posterior parietal region over the convexity, and if these give negative results, to make another pair in the frontal region just behind the hair line. It is often impossible to "lateralize" a subdural haematoma, and they are often bilateral, so that even a successful search on one side should not exclude a look on the other side. There should be no risk at all in making burr holes into the skull provided that the usual surgical precautions are taken, and no patient with increasing coma after a head injury should be allowed to die without the condition of the dura having been examined in this way.

Burning Feet

Q.—*For many years a man aged 70 has been troubled with burning feet. Usually the burning pain begins during the evening, and tends to be so agonizing at night that sleep is prevented and he often gets out of bed to walk on a cold surface. He has tried all the usual remedies, including raising the feet on pillows, soothing lotions, bathing the feet alternately in hot and cold water, but without relief. Two years ago he had the prostate removed, but without any benefit to the above condition. His blood pressure is normal for his age. There has been some recent irregularity of pulse, improved by digitalis. There are no signs of organic nervous disease, but the patient is lowered in tone by bad nights owing to the foot condition. I wondered if there is some disease of the spinal arteries, especially after reading some years ago that Profs. Telford and Stopford obtained good results after operation in thromboangiitis obliterans. The authors found that after removal on both sides of a section of the lumbar sympathetic cord which includes the 2nd, 3rd, and 4th lumbar ganglia the patients lost their pain and became able to resume work, etc.*

A.—The characters of the pain in the feet and the age of the patient suggest that the condition is an erythralgia associated with peripheral arteriosclerosis and consequent diminution in the peripheral circulation. It is unlikely that arterial spasm is a factor, but in any case the maximum degree of persistent vasodilatation will be obtained by application of warmth to the body rather than by local treatment of the feet or vasodilator drugs. Application of heat to the feet is best avoided as it will increase the blood-flow requirement by increasing the metabolism of the tissues locally. Theoretically this would aggravate the condition. It is suggested that a trial of the method of intermittent venous occlusion may be of value. The apparatus and method are described by J. J. M. Brown and W. M. Arnott in this *Journal* (1937, **1**, 1106, and 1938, **1**, 616). It may also be of help to keep the feet raised to a horizontal position on a support when resting during the day.

INCOME TAX

Forces Pay and Balance of Civil Pay

W. M. was engaged in local authority work up to June 4, 1943, when he joined the Forces. Taking his pay as £600 per annum he will receive £200 per annum from the local authority while in the Forces. How should he be assessed for the year to April 5, 1944?

*** (*a*) The local assessment will be reducible to 2/12th of £800=£133, plus 10/12ths of £200=£167—i.e., £300 less £40 superannuation contribution, £260 net. (*b*) The Forces pay will be assessable on 10/12ths of £600=£500 less uniform allowance £35, £465 net. The tax in both cases will be deductible by the employing authority, and the personal allowances will be divisible between the two assessments. The total tax will apparently be rather more than £160. If any difficulty arises over the necessary adjustment of the figures for this year, our correspondent should communicate with the local inspector of taxes or the Chief Inspector of Taxes, the Hydro, Llandudno, giving full particulars of his rank and unit.

LETTERS, NOTES, ETC.

The D Vitamins

Mr. A. L. BACHARACH (Glaxo Laboratories Ltd.) writes: I would like to make the following comments on the answer to the question about D vitamins (*Journal*, Sept. 18, p. 379) (1) D_2, or calciferol, is not to be dismissed as a "synthetic" substance; it is almost certainly the form of vitamin D present in the cocoa bean and in certain fungi, and it has been isolated from fish-liver oil, along with vitamin D_3. (2) By that same token, D_3 is not to be described as "the" naturally occurring vitamin present in animal fats, etc. (3) It is true that D_3 is formed by irradiating 7-dehydrocholesterol, and calciferol by irradiating ergosterol, but other non-antirachitic substances are formed in both instances at the same time. (4) It is true that at present calciferol is the only pure crystalline vitamin D that is made on a large commercial scale. It is, indeed, the substance that is put into all our margarine. (5) It is not true that "the only commercial vitamin is D_2." (6) The statement that "vitamin D_3 is never extracted commercially" is misleading without qualification. (7) Vitamin D_3 has been made on a manufacturing scale by preparing concentrates from fish-liver oils, and also by irradiating crude sterols (themselves extracted from natural sources) that contain appreciable quantities of 7-dehydrocholesterol. (8) Both these procedures have given place almost entirely, at any rate in this country, to the production of vitamin D_3 by irradiating pure 7-dehydrocholesterol, which is made by certain chemical changes from pure cholesterol. (9) The vitamin D_3 concentrates so produced are strictly analogous with the old "irradiated ergosterol" of the 1932 *Pharmacopoeia*, and, like it, contain irradiation products of the provitamin other than vitamin D. It has not, however, so far been commercially practicable to separate from the irradiation product pure vitamin D_3 on a large scale, though small quantities of the crystalline vitamin are available for clinical and laboratory investigations. (10) The irradiated 7-dehydrocholesterol so produced in very considerable quantities has been commercially available and in wide use in this country during the last two years, where it has formed an indispensable substitute for fish-liver oils, in very short supply, for chicken-feeding. (11) The most interesting point about vitamin D_2 and vitamin D_3 is the marked ineffectiveness of the former compared with the latter in preventing leg-weakness in the young growing chick. (12) The statement that "there is complete disagreement" on the relative values of D_2 and D_3 clinically is quite misleading. All experts (cf. recent books on vitamins by Rosenberg and by Bicknell and Prescott) are agreed that, if there is any difference at all between the two, it is very small and of no practical significance. I know of no "authorities" who deny this, and there is very good evidence in favour of the view that both vitamins are equally effective on both rats and men. Recent work has shown this to be true also for pigs.

Chicken-pox following Contact with Shingles

Dr. R. JOHN GOURLAY (Menston, Leeds) writes: A man aged 61 came to see me on July 28 complaining of intense pain in the distribution of the ophthalmic division of the fifth nerve on the right side. On July 30 the eyelids became swollen and a typical shingles rash developed supra-orbitally. The man was advised to stay at home and therapeutic measures were instituted. On Aug. 18 his wife, aged 51, complained of a feeling of general malaise, and on Aug. 21 I was called to see her. There was a generalized herpetiform eruption with irritation and an elevated temperature—obviously chicken-pox. By Aug. 27 the rash had faded and the subsequent convalescence was uneventful. The husband did not develop chicken-pox. The interest lies in the fact that there were no other cases of chicken-pox in the district at that time. I have seen this sequence of events happen on two previous occasions.